2003

Claimsmaking and risk construction : reverse osmosis in Pleasanton, California

Daniel Mark Hadsall
San Jose State University

CLAIMSMAKING AND RISK CONSTRUCTION: REVERSE OSMOSIS IN PLEASANTON, CALIFORNIA

A Thesis

Presented to

The Faculty of the Department of

Environmental Studies

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

by

Daniel Mark Hadsall

May 2003

Signature Page

APPROVED FOR THE DEPARTMENT OF ENVIRONMENTAL STUDIES

Dr. Dennis Jaehne, Professor of Communication Studies

Dr. Noam Cook, Professor of Philosophy

Dr. Les Rowntree, Professor of Environmental Studies

APPROVED FOR THE UNIVERSITY

ABSTRACT

CLAIMSMAKING AND RISK CONSTRUCTION:
REVERSE OSMOSIS IN PLEASANTON, CALIFORNIA

By Daniel M. Hadsall

This thesis addresses the controversy over plans to implement reverse osmosis technology in Pleasanton, California. Public planners in the region had hoped to use reverse osmosis filtration technology combined with groundwater injection to increase their capacities to dispose of treated waste water effluent. This case study uses an analysis of newspaper coverage and other public documents to explore the social construction of risk relating to reverse osmosis technology.

Results of this study show how opponents and proponents of the technology formulated arguments based in different risk assessment paradigms and employing different rhetorical idioms and motifs to advance their definitions of the risk associated with reverse osmosis injection. Additionally, it shows how disputants used the claimsmaking process to socially construct public conceptions of risk relating to the technology.

TABLE OF CONTENTS

CHAPTER I

PROBLEM STATEMENT AND OBJECTIVES

Introduction to the Research Problem

Conflicts over the actual or potential impacts of technologies have occupied an important place in recent environmental history (Gerlach 1987, 103; Nelkin 1984, 10). Events at Santa Barbara, Three Mile Island, Chernobyl, Prince William Sound, and Bhopal, to name only the most prominent, serve to remind the public of the potential severity of threats to human health and the environment posed by technologies the modern economy has come to depend on.

In recent decades, as the number of such conflicts has mushroomed, many more communities have experienced an increasingly broader array of technologically oriented environmental controversies. Local battles have been waged over a variety of technologies, including recombinant DNA techniques, pesticides and herbicides, petroleum transportation, high-voltage electrical transmission systems, municipal solid waste, hazardous materials and wastes, and highways (Gerlach 1987, 104; Serie, Dressen, and Weston 1991, 289). With some technologies, local opposition has become so successful that it has effectively stymied the use of such technologies. For instance, in the case of the siting of

hazardous waste management facilities, between 1980 and 1992 only six of 80 permits applied for had been successful (Kasperson, Golding, and Tuler 1992, 162).

One of the major consequences of the widespread nature of conflict over the use of potentially high-impact technologies has been the development of an industry responsible for assessing and managing the risk associated with these technologies (Freudenburg and Pastor 1992, 389). The multibillion dollar "risk" industry, situated within private industry, government, and academia, has developed sophisticated technical and statistical methods for assessing and managing risks (Nelkin 1982, 775). Despite the best efforts of many within this industry, the public has often remained unconvinced of the ability of risk professionals to manage risk. In many cases, the public has mobilized itself in opposition to technologies, in spite of assurances from risk experts that the technologies they were opposing were sufficiently "safe" (Nelkin 1982, 775).

At the heart of public controversies over technologies lie fundamental disagreements over the nature of risk as a phenomenon. The disagreements are often simultaneously ontological, epistemological, and ultimately political. They center on questions concerning how risk is best defined and whose definition of risk is the most legitimate. Such questions ultimately address the competing legitimacies of different forms of risk-related environmental knowledge. On

one hand stand technical concepts of risk that are reductionist and focus on quantifiable variables; on the other stand social concepts of risk that include cultural and experiential inputs (Plough and Krimsky 1987, 7). In this study of the reverse osmosis controversy in Pleasanton, California, the claimsmaking process is reconstructed to show how proponents and opponents constructed the two opposing definitions of risk.

Setting for the Case Study

The controversy over reverse osmosis technology in Pleasanton, California was both a conflict over the implementation of a wastewater treatment technology and a conflict between pro-growth and anti-growth forces in the Tri-Valley region of California. Four of the cities in the region--Dublin, Livermore, Pleasanton, and San Ramon--jointly operate a pipeline that transports treated wastewater over the coastal hills where it is discharged into the San Francisco Bay. The limited capacity apportioned to each of the four cities in the pipeline serves in turn to limit the development that each city can undertake. Dublin, in particular, became a strong advocate for increasing the pipeline capacity to accommodate its desired growth. Faced with significant opposition from anti-growth forces and the possibility that the pipeline expansion would not be

approved, the sewer agency serving Dublin and two other cities of the region proposed reverse osmosis coupled with ground water injection as an alternative to increase its wastewater disposal capacity. Reverse osmosis (RO) uses conventional sewage treatment processes coupled with advanced filtration techniques to filter sewage to standards equal to or better than those of drinking water[1]. Under the scenario first proposed for the Pleasanton area in 1995, the treated water was to be reinjected back into the drinking water aquifer (*Tri-Valley Herald*, 3 April 1995). According to project proponents, the injection of RO water was to accomplish three goals: to create more wastewater disposal capacity to accommodate proposed development, to diminish by dilution the increasing quantities of salt that have been accumulating in the area's groundwater basins, and to create an additional water supply. Beginning in 1997, proponents of the technology encountered opposition to the technology from people concerned over the risk to the environment and public health of injecting treated wastewater into aquifers used for drinking water, as well as from those concerned over the

---

[1] Conventional sewage treatment includes two to three stages of treatment that employ mechanical and bacteriological means to remove all visible contaminants in the waste water. Following conventional sewage treatment, the water is treated by microfiltration, which uses a polypropylene membrane to filter out 99% of suspended and colloidal solids, bacteria, and viruses (Pinholster 1995: 179). Final treatment by reverse osmosis involves forcing pressurized saline water through a semi-permeable membrane that inhibits the passage of dissolved solids, including salt (Newcom and McCarthy 1999: 12).

growth that might be induced by the increased wastewater capacity.

Problem Statement and Research Questions

This case study of the reverse osmosis (RO) controversy in Pleasanton, California, focused on how the principal actors--proponents and opponents of RO injection--formulated the two opposing conceptions of risk associated with the technology. The principal actors or claimsmakers included scientists, bureaucrats, public officials, activists and other members of the lay public. Specifically, this study explored the claimsmaking process engaged in by the principal actors to develop competing definitions of risk. The claimsmaking process was reconstructed, drawing on theories outlined in Hannigan (1995) and Hilgartner (1992) that suggest that the social construction of public problems, including those relating to risk, constitutes a process that passes through distinct, identifiable stages.

Q1. How did the claimsmakers involved in the controversy formulate competing definitions of risk at key points in the RO controversy?

Q2. How did the social construction of risk evolve over the course of the conflict surrounding the RO technology?

Research Objectives and Methods

In this study of the RO controversy, sociological and communication studies methods were used to study how claimsmakers constructed the competing definitions of risk. Specifically, rhetorical analysis in the context of a case study methodology was employed in an attempt to reconstruct the social construction of risk at several key points or "nodes" in the controversy. Primarily, written documents and newspaper coverage of the controversy were used to reconstruct the definitions of risk.

Implications

There are several implications of a case study of risk definition in a local, technically-oriented environmental conflict. One implication is that such a study may help develop a more holistic understanding of risk definition in a local environmental conflict (Kasperson 1992, 178). In particular, this study helps examine risk definition in its political context (Freudenburg and Pastor 1992, 398; Krimsky and Plough 1988, 5). Additionally, this study may also help to shed light on the role of different forms of environmental knowledge in the social construction of risk. These would include environmental knowledge in both its technical and non-technical forms (Kasperson 1992, 178; Buttel and Taylor 1992, 214). In particular, it may serve to highlight the importance of subjective and symbolic forms of risk-related

environmental knowledge (Krimsky and Plough 1988). These include forms of environmental knowledge having their origins in how people perceive environmental problems and how they communicate their perceptions through language and actions that extend beyond literal meanings. For instance, Plough and Krimsky (1987) suggest the example of the community group that produces a litany of negative health effects of contaminated water as communicating another more symbolic message: their anxiety over environmental overload. By illuminating the role of more subjective and symbolic forms of environmental knowledge, this study may help illustrate why more and better technical knowledge is often inadequate for solving environmental controversies over the risks of technologies.

The focus of this study on stages in the risk definition process has additional, more practical implications for those involved in risk-related public disputes. If this study helps to identify and characterize distinct stages in the definition of environmental problems involving risk, it may be useful to those seeking to influence these controversies. For instance, if as Hilgartner (1992) suggests, this study confirms that one of the stages in the social construction of risk is the construction of a causal linkage between the risk object and the harm, this knowledge may be useful to those attempting to engage or diffuse a controversy.

CHAPTER II

LITERATURE REVIEW

Problem Formation

Several researchers suggest the need for sociological studies of risk definition in technical conflicts. Freudenburg and Pastor (1992) see sociological analyses as a means of remedying past analyses that showed a bias toward the more technically oriented views of "institutional actors" (394, 399, 404). In contrast to past analyses that have emphasized public irrationality or the lack of public education about a technology as motivating public conceptions of risk, Freudenburg and Pastor (1992) emphasize the need for studies that focus on risk definition as a process that results from political and discursive struggle. Krimsky and Plough (1988) further cite the need for sociological studies of the multiple perspectives that contribute to the definition of risk (5). They call for analytic case studies that study the genesis and development of risk events, including the associated messages, meanings, and perceptions that constitute risk communication (5).

Other researchers focus specifically on the need for studies that apply social constructionist theory to risk definition. In calling for studies that examine risk as a

concept that is negotiated and developed through the political process, Freudenburg and Pastor (1992) make the case for the application of social construction theory. Constructionist theory focuses on the social, political, and cultural processes by which social problems are defined. Buttel and Taylor (1992) argue more generally that environmental sociology must give more attention to the social construction of environmental knowledge (214). Hilgartner (1992), on the other hand, recommends a narrower application of social construction theory to risk by arguing for studies that examine the social construction of the link between specific technologies and the harm they are thought to pose (41).

Researchers such as Hannigan (1995) see the need for social constructionist studies that focus on the claimsmaking process engaged in by disputants to environmental controversies. In particular, he sees the need to advance constructionist theory by conceptualizing environmental claimsmaking within a "wider framework of reality construction, frame analysis, and symbolic interactionism" (4). Additionally, Hannigan (1995) joins Freudenburg and Pastor (1992) in citing the need for social constructionist studies that address the issue of power. Specifically, Hannigan (1995) makes the case for studies that examine how power affects which claims are accorded legitimacy and which are rebuked (4).

In summary, several researchers see the need for case studies that use social constructionist theory to study the process by which multiple definitions of environmental risk are constructed. In this case, claimsmaking and constructionist theory were used to study how proponents and opponents of reverse osmosis (RO) injection constructed competing definitions of risk.

Risk Theory

Many theories explain the risk associated with technologies. Risk professionals, those in business, academia, and government who are responsible for assessing and managing risks, tend to subscribe to a body of theory that explains risk less as a subjective and more as an objective phenomenon, relatively independent of human perception (Plough and Krimsky 1987, 9). These theories are dependent on narrowly focused technical analyses that emphasize statistical variation and probability (Plough and Krimsky 1987, 9; Short 1984, 712). The ability of these theories to predict potential physical harms in the language of probabilities makes them useful for revealing, avoiding, and modifying causes that lead to unwanted effects (Renn 1992, 59). Much of the power of these theories is derived from their narrowly-focused objectivity and from their employment of scientific methods. Such scientific methods include the use of hypothetico-deductive methods and a common

language for measurement that allow comparison across risk events (Plough and Krimsky 1987, 9). For instance, using the technical concept of risk, risk assessors can compare the risk posed to the public by automobile collisions and nuclear plant accidents by measuring each as the product of the probability of the event and magnitude of the consequences (measured in number of deaths, injuries, illnesses, etc.) (Kasperson 1992, 155). The results of such a comparison suggest that the risk to the public of automobile collisions is much higher than the risk of nuclear plant accidents, a fact that conflicts with the public's perception of nuclear plant accidents as much more risky.

The fact that technical risk assessments often conflict with public perceptions has led some theorists, especially those in the social sciences, to develop alternative risk theories. Generally, social scientists have advocated theories in which risk is conceived of as a phenomenon with aspects that are subjective, being linked to human perception and human experience. Kunreuther and Slovic (1996) question the objectivity of technical theories of risk. They criticize the theoretical models used to calculate risk as being dependent on subjective assumptions in their structure, in the data fed into them, and in the presentation of the results to decision makers (119-120). Short (1984) takes issue with the absence of a consideration of values in technical theories of risk. He points out that theories

employed in traditional risk assessment assume that "cultural values, political wisdom, and judgments as to what is worth preserving are related solely, or in some linear fashion, to technical knowledge" (Short 1984, in Fowlkes and Miller 1987, 72).

The body of theories that social science uses to explain the origins of risk may be better known as "social theories of risk." Generally, all these theories share the assumption that risk assessment should be informed by a broader range of considerations, especially social factors, than those that inform technical theories of risk (Renn 1992, 76). How people perceive technologies and the harm they associate with them is one important consideration of psychological theories of risk. Several researchers have shown that the risk that people associate with a technology correlates with the extent to which the technology inspires feelings of dread and the extent to which the harm that may be associated with it is unknown (Kunreuther and Slovic 1996, 121; Peters and Slovic 1996, 128; Slovic, Fischhoff, and Lichtenstein 1985, 114). Sociologists have theorized that the degree of trust in the institution and the individuals that are responsible for managing the risk is an important factor in determining the risk people associate with a technology (Clarke and Freudenburg 1993; Kasperson, Golding, and Tuler 1992; Short 1984; Freudenburg 1993, 1996; Slovic 1993; Walsh 1987, 85). Cultural theorists cite the importance of cultural belief

patterns as determining factors for how individuals and social constituencies determine risk (Dake 1992, 28; Douglas and Wildavsky 1982, in Fowlkes and Miller 1987, 72; Peters and Slovic 1996, 1430). Cultural belief patterns include groups of related convictions and perceptions of reality (Renn 1992, 71-2). A primary assumption of proponents of this body of theory is that cultural patterns pre-figure the mind-set of individuals and social organizations to take on certain values and to reject others (Renn 1992, 72).

In short, theoreticians from diverse fields, spanning the physical sciences and the social sciences, have developed a large body of contested theories to explain the phenomenon of risk.

Constructionist and Claimsmaking Theory

In contrast to other approaches to the study of risk, a social constructionist approach to risk in environmental controversies implies a more holistic focus on the social, political, and cultural processes used to define environmental conditions as risky (Hannigan 1995, 30). Hannigan (1995) and others point out that the social constructionist approach to environmental conflicts does not deny objectively observed conditions nor does it deny independent causal powers of nature. Instead, social constructionist theory attempts to account for the fact that the identification, assessment, and prioritizing of

environmental problems does not always correspond to objectively observed conditions (30). Hannigan (1995) explains the different and competing assessments of environmental problems among groups with the term "contradictory certainties."

Ibarra and Kitsuse (1993, 30) focus on the discursive processes that cause different assessments of environmental problems. They attribute different definitions of a given problem to the existence of different "symbolically demarcated social realities." They cite the importance of a focus on the claimsmaking process, by which differing and often competing conceptions of an environmental problem evolve as different groups interact, largely on a rhetorical level (Ibarra and Kitsuse 1993, 30). Hilgartner and Bosk (1988) describe this complicated rhetorical interaction as existing among various groups, including competition with other issues, and including competition between different ways of framing a social problem. Specifically, competing groups with conflicting goals seek to outline or frame arguments in the public arena in a way that enables each to accomplish its own ends. They struggle against other issue "entrepreneurs" for the limited attention of the public. A study of the claimsmaking process necessitates identifying and reconstructing the rhetorical practices of different groups as they seek to press their concerns (Ibarra and Kitsuse 1993). Such rhetorical practices may include forms of

talk (rhetorical idioms and motifs), frames of interpretation, and contexts for articulation (features of settings) (Ibarra and Kitsuse 1993, 33). This analysis of claimsmaking during the RO controversy focused on rhetorical idioms[2] and motifs as a means of reconstructing the rhetorical practices of proponents and opponents of reverse osmosis.

Other theoreticians have adopted a broader focus by identifying stages of the social construction process over the course of the controversy. Hannigan (1995, 41-49), drawing on the work of others, outlines three distinct stages in the social construction of environmental problems: assembling the claims that define the problem; presenting the claims to publicize the problem; and contesting claims to achieve a remedy for the problem. Hilgartner (1992, 42) focuses more specifically on the early stages of the social construction of risk by identifying three distinct phases in risk definition events: the identification of a risk object (i.e., a technology); the definition of the harm associated with the object; and the construction of a causal linkage between the object and the harm. In the second part of this study the concept of identifiable stages in the social construction of environmental problems was studied by

---

[2] Rhetorical idioms are image clusters used to construct arguments; motifs are recurring images or metaphors that help constitute arguments. Both will be explained in more detail in the "analysis" section (Ibarra and Kitsuse 1993).

comparing claimsmaking at important points in the social construction of risk in the RO controversy.

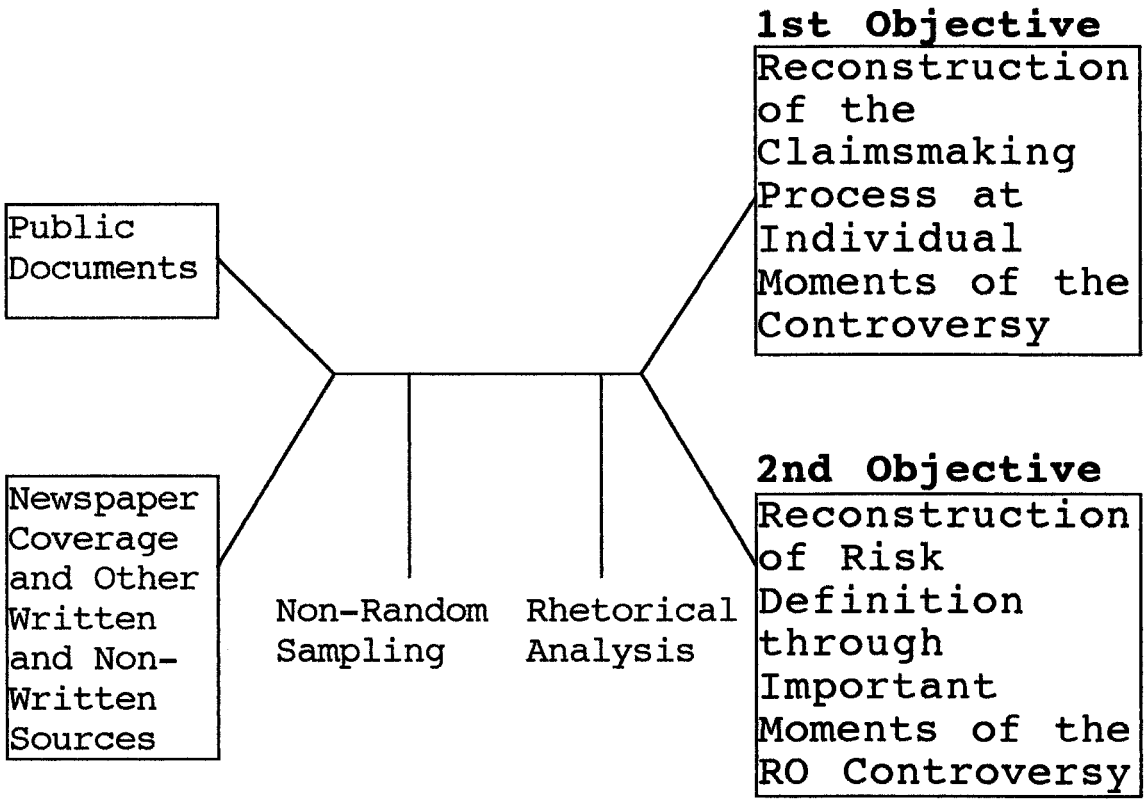
Summary

There is an extensive literature treating the phenomenon of risk in technological conflicts. The risk literature may be classified into two types: those examining risk as an objective, probabilistic phenomenon that may be studied with technical, scientific methods; and those examining risk as a social and psychological phenomenon that may be studied using theories and methods from the social sciences. Several social science researchers suggest taking a more holistic, process-oriented approach that employs social constructionist and claimsmaking theories to examine how multiple perspectives, including those informed by both technically-derived and socially-derived forms of environmental knowledge, contribute to risk definition in local political contexts. Some researchers suggest using a case study methodology to study the interactions at play in the formation of risk. Others cite the need for studies that differentiate and describe stages in the social construction process.

CHAPTER III

RESEARCH DESIGN

Conceptual Framework



The constructionist position on risk in conflicts over technologies maintains that risk formation is part of a political process in which people drawing on divergent social realities and employing different discursive practices construct different and often competing definitions of the risk associated with a given technology. This study explored how, through the claimsmaking process, the two sides constructed one or potentially several competing definitions of risk at individual moments of the controversy. Additionally, claimsmaking was examined at the points of greatest claimsmaking activity over the course of the controversy to study whether and how risk definition evolved. In contrast to other studies of risk, which approach risk from more positivistic perspectives, this study took a social constructionist approach to risk, which implies a more interpretivist methodology and the use of qualitative methods.

Primarily, this research employed written data to study claimsmaking and risk construction in the reverse osmosis controversy. Written data in the form of public documents and newspaper coverage was used to study rhetorical positions advocated by both proponents and opponents of RO.

Generally, non-random sampling methods typical of qualitative case studies were used, which sample for balance and variety over representativeness (Stake 1994, 244). Two

primary considerations were taken into account to establish the sampling methodology. First, sampling, particularly of written data chronicling the debate over RO injection, focused on pre-established categories from the communication studies and sociological literature that relate to the rhetorical resources employed by the claimsmakers. These categories included different types of rhetorical idioms and rhetorical motifs, which are discussed in more detail below. Second, sampling was limited to three important moments of the controversy, when claimsmaking activity was especially significant, due either to the intensity of the claimsmaking or to a change in the nature of the controversy. A rhetorical analysis of the data was conducted.

The primary focus of the analysis was to reconstruct the claimsmaking activity that constituted the boundaries of the discourse used to construct collective representations of risk (Holstein and Gubrium 1994, 267). Chiefly, the analysis involved looking for commonalities in the discursive practices of the claimsmakers as a means of reconstructing the definitions of risk associated with the RO technology (Ibarra and Kitsuse 1993, 34).

Theoretical Setting

Constructionist studies belong to the broader category of sociological studies that are ethnomethodological (Holstein and Gubrium 1994, 164). Ethnomethodology owes its

origins to people such as Alfred Schutz and Harold Garfinkel who challenged naturalistic attitudes that posited social reality as existing "out there," independent of subjective experience. Instead, ethnomethodology focuses on the capacity of people to use subjective meaning and experience to constitute objective social reality (Holstein and Gubrium 1994, 164). The ethnomethodological approach shares its focus on how humans create social reality with ethnographic studies. Where the two differ is in their focus on the importance of language: ethnographic studies treat language as a neutral conduit for examining the creation of social reality in a given context; ethnomethodological studies focus on how naturally occurring discourse and interaction act to constitute the settings themselves (Holstein and Gubrium 1994, 164).

There are two types of case studies: intrinsic case studies and instrumental case studies (Stake 1994, 236). Intrinsic case studies are used to understand the particulars of a given case; instrumental case studies are used to understand and clarify theory pertaining to a larger number of cases (Stake 1994, 236). This study used an intrinsic case study methodology to study the application of claimsmaking and social construction theory to risk definition in Pleasanton, California.

Geographic, Demographic, and Social Contexts

The physical setting for this case study is the Tri-Valley region, which is situated in the greater Bay Area of Northern California. The Tri-Valley is comprised of five small to mid-size cities. Livermore is the largest (est. pop. 75,221), followed by Pleasanton (est. pop. 65,478), San Ramon (est. pop. 46,109), Danville (est. pop. 42,854), and Dublin (est. pop. 32,570) (Horner 2002). All five of these cities are separated from the San Francisco Bay by the Coastal Range of mountains on the west.

The Tri-Valley is part of an (until recently) rapidly expanding Bay Area economy, which is characterized by computer manufacturing, finance, and a large service sector, including wholesale and retail trade (California Statistical Abstract 2000). The Tri-Valley is situated along major transportation corridors, including Highway 680, which runs north to south, and Highway 580, which runs east to west. Increasingly, the Tri-Valley is becoming a bedroom community for people to live in and commute from to cities such as San Jose and San Francisco. The increasing suburban status of the region has led to pressure for more residential and commercial development, as well as opposition from anti-growth forces, some of whom are situated within the larger environmental community (*San Jose Mercury News*, 28 July 1997, Local 1B).

The people of the Tri-Valley cities differ from other cities of the Bay Area by being predominantly Caucasian in racial origin. In contrast to larger, more urban Bay Area cities, such as San Francisco, San Jose, and Oakland, where Caucasians make up 49.7%, 47.5%, and 31.3% of the population, respectively, more than two-thirds of the inhabitants of each of the five Tri-Valley cities listed below are Caucasian (Danville, 86.3%; Pleasanton, 80.4%; San Ramon, 76.8%; Livermore 81.9%; and Dublin, 69.4%) (Horner 2002).

Socioeconomically, people who live in the Tri-Valley tend to be more professional and more affluent than those people living in other cities of the Bay Area. Compared to San Jose, San Francisco, and Oakland, where the 1989 median household income was $46,206, $33, 414, and $27,095, respectively, the 1989 median household income in the Tri-Valley ranged from a high of $74,472 to a low of $49,149 (Danville, $74,472; San Ramon, $63,607; Pleasanton, $59,458; Dublin, $53,710; and Livermore, $49,149) (Horner 2001).

Politically, citizens of the Tri-Valley are more conservative than their counterparts in other parts of the Bay Area. The cities of the Tri-Valley belong to two Bay Area counties where the majority of the residents are registered Democrats: Alameda County (56.6% Democrat, 20.2% Republican) and Contra Costa County (49.4% Democrat, 32.2% Republican) (Horner 2002). In contrast to other cities in these two counties, majorities in four of the five Tri-Valley

cities are registered Republicans: Danville (31.5% Democrat, 51.5% Republican); San Ramon (34.7% Democrat, 45.1% Republican); Pleasanton (37.1% Democrat, 43.3% Republican); Livermore (38.8% Democrat, 40.5% Republican); and Dublin (40.7% Democrat, 37.4% Republican) (Horner 2002).

In summary, citizens of the Tri-Valley region are predominantly Caucasian and are more affluent and more conservative in comparison to their counterparts in more urban areas of the Bay Area.

Historical Background

The connection between sewer policy and growth politics in the Tri-Valley goes back to the late 1970's, when the export pipeline that currently carries treated sewer water from treatment plants over the coastal hills and into the San Francisco Bay was built (see table A1 for timeline). Slow-growth advocates prevailed by getting a smaller pipe that helped to limit growth in the region. The most recent chapter in Tri-Valley sewer politics, which culminated in the RO controversy, began when it became evident in the mid-1980's that the original 1970's pipeline was failing and would need to be replaced.

The conflict over growth and sewage continued through the mid-80's and into the 1990's as pro-growth and slow-growth forces continued to argue over the ultimate size of the new export pipeline. Slow-growth forces, represented by

the cities of Pleasanton and Livermore, were opposed by the City of Dublin and the Dublin San Ramon Services District (DSRSD), the sewer agency serving the cities of Dublin, Pleasanton and San Ramon. Negotiations between the cities and the sewer district yielded a series of tentative agreements between 1991 and 1994 that repeatedly unraveled over the size of the pipeline needed to accommodate peak flows during winter rains (*Valley Times*, 5 May 1996, 1A:1). The growth that would be caused by several proposed housing developments in the region, including Ruby Hill in southeast Pleasanton and Dougherty Valley east of Dublin, contributed to the controversy and to the difficulties of the negotiations.

Although Livermore successfully introduced RO technology to the region in the form of an RO pilot plant, which recycled water to be used on local golf courses, the controversy over RO began after DSRSD proposed using RO coupled with reinjection into local aquifers as a means of increasing its disposal capacity, which they needed to accommodate Dublin's proposed plans for growth. Opposition to RO began in early 1997, shortly after DSRSD certified the environmental impact report (EIR) for the RO project. At first, the nature of the opposition was institutional and legal as the cities of Pleasanton and Livermore threatened to sue DSRSD to stop the project because of concerns over water quality and growth. Shortly thereafter, the opposition became more grass-roots and political with the formation of the Safe

Water Committee (SWC), a group of local activists who emphasized their concern with the issue of how RO-injected water might adversely impact water quality in the underground aquifers. The early phase of the controversy culminated in the summer of 1998 with several well-attended public meetings[3] in Pleasanton, in which grass-roots opposition was successfully mobilized, leading both the City of Pleasanton and Zone 7, the local water agency serving the area, to actively oppose RO injection.

After briefly tabling the RO project in late 1998, DSRSD sought to muster support for the technology by hiring outside consultants to implement a public relations program and to conduct a 16-week test-run of its recently completed $17 million RO plant. Results of the test run of the technology demonstrated that RO water surpassed all standards for drinking water quality. Public opinion polls conducted by DSRSD and Zone 7 throughout 1999 and into early 2000 showed that there was qualified public support for the technology, although a majority of residents preferred that the recycled water be used for irrigation instead of injection. Results of the polling were controversial, due in part to the fact that

---

[3] These public meetings include a meeting before the Pleasanton City Council on 8 September 1998, as well as two "special meetings" before the Zone 7 Water Agency Board of Directors on 6 August 1998 and 15 September 1998. The 8 September 1998 meeting before the Pleasanton City Council lasted five-and-a-half hours and was recorded on video tape, as well as transcribed in the "Minutes of the City Council." Both meetings at the Zone 7 Water Agency were also recorded in the agency's minutes.

the two sides criticized one another for how each conducted its polling (*Tri-Valley Herald*, 30 December 1999).

As DSRSD awaited final approval of the RO project from the Bay Regional Water Quality Control Board (BRWQCB) in late 1999, the City of Pleasanton continued to foster opposition by making the project the subject of a non-binding ballot measure which asked the citizens of Pleasanton whether RO-treated sewer water should be injected back into the Valley's groundwater basin (Pleasanton 1999a). Although the RO project was soundly defeated by the non-binding referendum in Pleasanton on March 7th, 2000, the BRWQCB gave its approval of the project on technical grounds.

Following the referendum and the approval by the BRWQCB in early 2000, the City of Pleasanton and Zone 7 appealed the permitting decision and filed suit in court. The City of Pleasanton and DSRSD engaged in several rounds of negotiations during which the City of Pleasanton threatened to withdraw financing for the new export pipeline if not given veto power over any decisions made regarding the future injection of RO water. Ultimately, in December 2000, the City of Pleasanton gave in and agreed to finance the new export pipeline without veto power, due in part to pressure to finally rebuild the failing pipeline, whose ultimate size had required 15 years of negotiation and without which cities of the region would not be able to accommodate their longer-term growth plans.

Ground was broken on the new export pipeline in May 2001 (*The Independent*, 10 May 2001, 4:4) and was expected to be completed in late 2002 or early 2003.[4] In May 2002, RO proponents were dealt a setback when a superior court judge rescinded the decision authorizing RO injection and referred the issue back to the Bay Regional Water Quality Control Board for reconsideration (*Tri-Valley Herald*, 1 May 2002). DSRSD officially backed off on its policy advocating RO injection in October 2002, due both to continued public opposition and to the anticipated new export pipeline.

Description of Data Sources

There are many potential sources of data in a constructionist study focusing on claimsmaking. In large part, this is because claimsmaking for most significant public controversies involves many different actors operating in many different arenas over a long time frame (Hannigan 1995, 100; Ibarra and Kitsuse 1993, 53). In this particular case, all data sets relating to claimsmaking during the RO controversy were limited to the last six or seven years, beginning when reverse osmosis was first seriously considered as an alternative to an increase in pipeline capacity.

---

[4] DSRSD maintained throughout the later stage of the controversy that it might use RO injection if the new pipeline and pipeline repairs were not completed in time to accommodate peak waste water flows during winter storms.

Data from printed sources included an array of different materials from different arenas. The mass media constituted one such arena (Hannigan 1995, 100; Ibarra and Kitsuse 1993, 53). Printed data in the form of articles, editorials, and "letters to the editor" were collected from three local papers during three several-month time frames between May 1998 and March 2000. The newspaper data were used to help reconstruct the definition of risk at key points or nodes in the controversy. *The Valley Times*[5] and *The Tri-Valley Herald,* [6] papers which have more of a regional focus and which cover state and national news, were used in this study. *The Independent,* [7] a paper with a more local focus that gives very detailed coverage of events limited to the communities of the Tri-Valley, was also used.

Other sources of data originating from printed material came from scientific, administrative, and legislative arenas. In particular, transcripts from public fora served as a significant source of the claimsmaking data. They included transcripts of minutes from city council meetings, water board meetings, sewer agency meetings, and state water and

---

[5] The *Valley Times* is one of three editions of the *Contra Costa Times* published in Contra Costa County. The three editions cover all cities in Contra Costa County, as well as Dublin, Pleasanton, Livermore, and Castro Valley in Alameda County.

[6] *The Tri-Valley Herald* publishes editions in Alameda, Contra Costa, and San Joaquin Counties, which are circulated to Alamo, Blackhawk, Danville, Diablo, San Ramon, Dublin, Livermore, Pleasanton, Sunol, Lathrop, Manteca, and Tracy.

[7] *The Independent* is published on a weekly basis in Livermore, CA. It has a small circulation of 46,000 people, limited to Tri-Valley communities.

public health regulatory agency meetings. Reports and publications from public agencies and from the consultants they contracted served as another potential data set. Activist publications also constituted another source of written materials. Sampling of transcripts from public fora was focused on meetings of the Pleasanton City Council and on meetings of the Groundwater Management Advisory Committee of the Zone 7 Water Agency. Meetings before both of these bodies produced some of the most vigorous debate over the potential risk posed by RO injection; consequently, their transcripts served as good records of some of the most significant public claimsmaking by participants to the RO controversy.

Sampling Strategy

The sampling strategy for this study took into account several factors. First, only the elements of the previously-mentioned data sets that related directly to how disputants defined the risk associated with the RO technology were sampled. To achieve this end, sampling focused on the collection of claimsmaking data that: 1) defined the harm(s) associated with the RO technology; and 2) constructed the causal linkage between the RO technology and the harm (Hilgartner 1992, 42). Examples of harm include the contamination of groundwater aquifers by chemicals, bacteria, and viruses; the inducement of run-away growth; negative effects on the aesthetic qualities of the drinking water; and

harm to a city's image due to the drinking of its own sewer water. Examples of causal linkages between the source of harm and the RO technology include inadequate standards and monitoring for contaminants; insufficient research, especially of potentially unknown contaminants; potential technical failures in treatment and monitoring systems; and biased decision making by "untrustworthy" officials and the public agencies they serve.[8]

As previously mentioned, an additional factor in the sampling strategy is that sampling was limited to several key points in the controversy. These three points were chosen to reflect two important considerations: 1) They centered around important events in the controversy that generated the most intense claimsmaking activity; 2) They represented distinct stages including those near the beginning, middle, and end of the RO controversy and therefore represented the best possibility for retracing the social construction of risk over the broader course of the controversy.

The first period data was sampled extended approximately four months from May 18th, 1998 to September 23rd, 1998. This period was chosen for several reasons. First, May 1998 represented an early point in the debate, when the Safe Water Committee (SWC), the primary group of activists opposing the

---

[8] I coded 682 opponent arguments, including 306, 151, and 225, in the first, second, and third sampling periods, respectively (See Table A2). I coded 633 proponent arguments, including 170, 274, and 189, in the first, second, and third sampling periods, respectively (See Table A3).

RO project, was fully organized and active. May 18th, 1998, in particular, represented the date of the release of a position paper by the SWC, in which they first systematically outlined their arguments against the RO injection project. Furthermore, these dates encompassed a period during which activists successfully mobilized members of the public in opposition to the technology, which resulted in a critical city council meeting in the City of Pleasanton on September 8, 1998, that led Pleasanton to withdraw its support for the technology.

The second period data was sampled extended eight months from April 26, 1999 to December 30, 1999. This period included several important events in the second phase of the RO controversy, during which time RO proponents mounted a public relations counteroffensive to the earlier successful efforts by opponents of the technology. First, it represented a period during which the Dublin San Ramon Services District (DSRSD), the sewer district sponsoring the RO project, was fully engaged in a sophisticated public relations campaign that included public opinion polls, informational mailings, presentations to local civic organizations, and tours of the RO facility. Second, these dates encompassed the release of two sets of scientific data--one preliminary and one final--undertaken as test runs of the quality of water produced by DSRSD's actual RO facilities. The release of these sets of data was accompanied by several hearings attended by

university professors, who acted as experts in engineering and water quality. The professors gave testimony concerning the RO project and interacted with opponents and other members of the public. Lastly, this period included the initial debate surrounding the drafting of Measure J, Pleasanton's non-binding referendum on RO injection.

The third period data was sampled lasted one-and-one-half months from February 8th, 2000, to March 21st, 2000. This period was primarily important because it encompassed the public debate that preceded and followed a non-binding referendum held by the City of Pleasanton on March 7th, 2000, which asked voters to decide whether RO treated waste water should be injected into local ground water aquifers.

The need to produce valid results was considered in the crafting of the sampling strategy. Chenitz and Swanson (1986) suggest means of ensuring validity and reliability for grounded theories that may be equally applicable to other qualitative sociological studies, including the constructionist undertaken here. Of most interest for this study was their suggestion to use multiple sources of data sampled very broadly (Chenitz and Swanson 1986, 11).

Analysis

The analysis consisted primarily of reconstructing the claimsmaking process that produced socially constructed definitions of risk relating to the RO injection technology.

Essentially, the analysis entailed identifying commonalities in the discursive practices of the claimsmakers themselves as a means of reconstructing the claimsmaking process (Ibarra and Kitsuse 1993, 34). This process of identifying commonalities focused on the construction of the arguments or "claims," as well as at the broader level of the use of rhetorical or "vernacular" resources by the claimsmakers. Essentially, the claims or arguments are comprised of the elements used to articulate the public problem and its potential solutions; rhetorical or vernacular resources constitute the discursive means by which language is strategically employed to communicate the claims.

Ibarra and Kitsuse (1993) use several categories to describe the vernacular resources employed by claimsmakers. These include claimsmaking styles, rhetorical idioms and motifs, and counterrhetorics (33). In this analysis of the claimsmaking undertaken during the RO controversy, the focus was placed on rhetorical idioms and motifs because they afforded the best opportunity to reconstruct the communication strategies employed by claimsmakers. An analysis of claimsmaking styles was also used to help reconstruct the social construction of risk over several key points in the controversy. An analysis of claimsmaking styles proved useful for reconstructing broader claimsmaking trends over several periods of the controversy.

Ibarra and Kitsuse (1993) define rhetorical idioms as "image clusters" that locate social problems in moral universes. They identify five basic rhetorical idioms or "rhetorics" that include the rhetoric of loss (decrying the devaluation of something pure or unique); the rhetoric of entitlement (emphasizing the virtue of ensuring institutional access for all); the rhetoric of endangerment (expressing the right to be safe from threats to the health and safety of the human body); the rhetoric of unreason (highlighting concerns over being taken advantage of); and the rhetoric of calamity (evoking the unimaginable state of utter disaster).

In contrast to rhetorical idioms, rhetorical motifs are recurring metaphors or figures of speech (Hannigan 1995). For instance, Hannigan (1995) cites the examples of AIDS as "plague" or "the war on drugs."

Claimsmaking styles refer to the bearing or tone with which the arguments are made. Ibarra and Kitsuse (1993, 51-53) identify five basic claimsmaking styles that include legalistic (presuming that claimants are speaking on behalf of a third party, whose rights are embodied in law); scientific (employing a disinterested bearing, sober tone, and precise, technical vocabulary); civic (characterized by moral indignation and an unstylized presentation of "common sense" positions); theatrical (employing staged dramatizations to illustrate the group's moral critique);

and comic styles (highlighting absurdities and hypocrisies in positions and drawing on irony or sarcasm).

The coding process involved multiple stages and was similar to that used to construct grounded theories (Chenitz and Swanson 1986: 9). First, data from each period was sampled broadly to establish preliminary categories of arguments relating to how disputants defined the risk associated with RO. This initial sampling focused on potential harms and potential causal relationships between RO and harms (Hilgartner 1992, 42). In the second stage of the analysis, the categories of argument were refined, data was recoded, and final counts for data relating to each category of argument were recorded. In the third stage of the analysis, the system of rhetorical motifs developed by Ibarra and Kitsuse (1993) was used to make sense of the categories of argument in a broader theoretical framework. During this stage, the process was begun to characterize how specific arguments were more or less prevalent from one sampling period to another.[9] In the final stage of analysis, social construction theory, such as that embodied in Hannigan (1995), was used to help compare and contrast claimsmaking trends in the form of rhetorical motifs and claimsmaking styles. These trends were used to help reconstruct the risk definition process.

---

[9] A qualitative methodology was used to analyze the data. The interpretation of the data is not meant to be statistically significant.

NUD*IST, a qualitative data management software program, was used to help process and analyze the data. In particular, it was used to help transcribe the data, code the data, and to re-organize the data for purposes of analysis (Strauss and Corbin 1998).

Presentation of Results

Results were organized according to rhetorical motifs. The order of rhetorical motifs in the results section represents the need to present claims identifying potential harms prior to those identifying causal relationships between RO and harms. Opponent arguments are presented before proponent arguments in each section of the results because proponent arguments seem to be employed more frequently to counter opponent arguments.

CHAPTER IV

RESULTS

Rhetoric of Loss

Contamination Claims: Opponents

The potential contamination of the groundwater by chemicals and pathogens found in RO-treated water is an important opponent argument throughout the controversy. Contamination arguments may be separated into two groups: those that focus on the actual types of contaminants themselves and those that warn of the potential contamination of a closed basin.

One type of contamination argument focuses on the possibility of contamination by either known or unknown contaminants. The first class of contaminants includes known chemicals and pathogens, such as NMDA (Nitrosodimethyalamine, a chlorinated hydrocarbon), estradiol (a hormone), tritium (a radioactive form of water), and cryptosporidium (a parasitic sporozoa)--to name just a few. The second class, unknown contaminants, includes chemicals and pathogens that opponents claim are either too small to be filtered or are as yet unidentified scientifically.

Arguments citing known contaminants, such as those listed above, are prevalent in the first period, decreasing during the second[10] and third periods (see table A2). In the second period, instead of targeting specific known chemicals, opponents focus their arguments on generic classes of known chemicals, such as illegal drugs, endocrine disrupters, and medicines emanating from sources like hospitals and prisons. One opponent writes in a letter-to-the-editor, "All the drugs, medicines, hormones and estrogens from the prison, two hospitals and from domestic use may remain in solution and pass through reverse osmosis membranes" (*Tri-Valley Herald,* 17 July 1999). These arguments are as much about the sources that produce the contaminants as they are about the contaminants themselves and may, by associating the contaminants with known undesirable substances and institutions, represent an attempt to increase the emotional impact of contamination arguments. As such, these arguments may be a response to the public relations program conducted by DSRSD. The lack of arguments citing known contaminants in the third period is probably due to the fact that arguments referring to known contaminants, especially those for which state standards and tests exist, are relatively easily refuted with water quality tests, such as the 16-weeks test conducted during the second sampling period.

---

[10] Generally, there are fewer opponent claims relative to proponent claims in this period.

Arguments citing unknown contaminants are more numerous in the first and third periods, but not as numerous in the second period (see table A2). They also probably decrease in the second period because of Dublin San Ramon Services District's (DSRSD's) public relations and water-quality-testing program. Both of these events help to focus the attention of the media and the public on proponent arguments, as well as to bolster scientific credibility, a factor that would diminish the effectiveness of arguments citing both known and unknown contaminants. The increase in the third period of arguments referring to unknown contaminants is likely a result of the general power of this type of argument: by capitalizing on what is not presently known by science, opponents use concerns over the possible discovery of future contaminants to cast doubt on current, scientifically-based assertions of the technology's safety. The following quotation from the third sampling period illustrates how opponents focus on what science does not know to help define the risk associated with RO injection:

> Even though the treated sewage is tested today, it is logical to assume that 25 years from now, we will again discover that it contained compounds of concern that we don't know about today. By then, the entire basin may be contaminated and impossible to clean up. (*Valley Times*, 26 February 2000, 25a:1)

The second general category of contamination argument includes those arguments referring to the possibility that contaminants may irreversibly damage a closed basin. This

type of contamination argument is a common argument across all three sampling periods and is especially prevalent in the second and third sampling periods (see table A2). Its strength as an argument may be due to its fundamental importance in defining the risk opponents associate with RO injection: of the three elements of Hilgartner's (1992) risk definition model (identification of risk object, definition of harm, and establishment of a causal link between object and harm), arguments referring to the contamination of the basin are critical for defining the harm. Opponents derive other harms, including those to the public health, to public finance, and to the area's economy by assuming the contamination of the closed basin.

The significance of claims citing the potential irreversible damage of a closed basin lies in the meaning and value that opponents give to the basin. Opponents emphasize that the basin is essentially closed, pointing out that without the cleansing effect of significant outflow from the basin, any contamination would tend to concentrate over time and would be impossible, or at least very expensive, to get out. Opponents use this assertion to argue that the basin enjoys the status of a unique natural resource. Words such as "pure," "precious," and "pristine" are used to express its unique value. Possible contamination of the basin is frequently described as "irreversible." For example, one member of the public states, "This project has the potential

of causing irrevocable risk to a precious resource" (Alameda County, Zone 7 Board of Directors 2000, 6). Another asks, "Are we so desperate for drinking water that we're willing to allow our vital underground natural water reservoir to be possibly contaminated by potential toxins?" (*Tri-Valley Herald*, 14 February 2000)

Contamination arguments generally reflect what Ibarra and Kitsuse (1993) refer to as the "rhetoric of loss." The rhetoric of loss is rooted in language that decries the loss of prestige or value of something pure or unique. The idiom's moral vocabulary includes positive terms such as "purity," a word characteristic of the previously-mentioned class of terms that opponents frequently associate with the closed basin, and negative terms such as pollution and contamination (Ibarra and Kitsuse 1993, 37).

One particularly prominent negative term opponents associate with RO injection is the word "sewage." Opponents go beyond stating that RO water is produced by a process that uses sewage to implying that RO water is sewage itself. In effect, opponents employ a figure of speech or a motif equating RO water with "sewage," which acts as a shorthand description of RO injection (Ibarra and Kitsuse 1993, 35). The following quotations, one from each sampling period, serve as examples of several typical uses of the "RO water as sewage" motif:

> Ms. Barker said she does not want to drink sewage no matter how clean it is. (Alameda County, Zone 7 GMAC, 3)
>
> Are you prepared to risk your family's health by drinking, cooking, and bathing with treated sewage? (Pleasanton 1999a, 3)
>
> Clearly, DSRSD and RWQCB are hell-bent on making us drink treated sewage, despite the outcry of the citizens. (*Valley Times*, 28 February 2000, 11a:4)

The "sewage" motif is prevalent in arguments in all three sampling periods, likely due to the succinctness with which it enables opponents to create negative images and to evoke negative feelings associated with RO injection (see table A2).

"Inadequate Treatment" Claims: Opponents

Another common class of arguments related to the possible contamination of the ground water aquifer are those arguments that claim that the RO treatment process is itself flawed. Arguments targeting the treatment process generally focus on four aspects of the treatment process: source control, filtration, safeguards, and monitoring. The following quotations, in their respective order, serve as examples of the four types of "inadequate treatment" argument:

> This untested scheme . . . puts existing residents at risk for exposure to unknown toxic materials contained in municipal sewage from industrial as well as residential sources. (*Tri-Valley Herald*, 19 August 1999)

> We can make no assumptions that the filtering will remove all viruses and chemicals from the sewage. (Alameda County, Zone 7 Board of Directors 2000, 5)
>
> There is no facility where flows that do not meet state and federal standards can be diverted. (*Valley Times*, 15 February 2000, 17a:1)
>
> Assays more sensitive than mere salinity must be developed to allow the detection and replacement of deteriorating membranes . . . .(Cooper et. al 1998, 18)

Inadequate treatment arguments are prevalent during the first period but, aside from arguments citing the lack of safeguards, they drop off significantly during the second sampling period, only to rebound slightly in the third period (see table A2). A likely cause of the decrease during the second period is DSRSD's public relations program and their publication of results from the 16-weeks test: not only does DSRSD use the 16-weeks test to confirm the effectiveness of RO treatment as measured against water quality standards, but it uses the public relations program to describe in detail aspects of its treatment process, including its safeguards and monitoring program.

Opponents use claims focusing on the RO treatment process to construct the causal link between RO injection as a risk object and the contamination of the aquifer as a harm. The obvious causal link between RO injection and contamination is that contaminants that escape filtration due to inadequacies in the technology, to system failures, or to human error would be injected into the basin, contaminating

the groundwater. The following quotation from a news article in the third sampling period serves as an example of the connection between concerns over inadequacies in the treatment process and the contamination of the aquifer:

> Opponents, however, cited concerns about whether system failure or human error could contaminate the valley's entire ground water basin. They warned of potentially harmful contaminants that scientists don't know about that may have molecules too small to be filtered out by reverse osmosis. (*Valley Times*, 8 March 2000, 1a:1)

In short, arguments citing the potential contamination of a closed groundwater basin constitute a central thrust of the claimsmaking by opponents. Those against RO injection employ the rhetoric of loss, arguing that the basin is a unique natural resource that will be irreversibly contaminated by a water source that they equate rhetorically with sewage.

Rhetoric of Endangerment

"Public Health Threat" Claims: Opponents

Beyond the actual contamination of the basin itself, arguments referring to the potential contamination of the groundwater help to define several other derivative harms that may be associated with RO injection. Public health threats constitute one of these other classes of harm.

Arguments citing concerns over public health are most numerous in the first sampling period (see table A2). During the first sampling period, arguments include both general

references to potential harms to public health as well as many references to specific health effects that might result from groundwater contamination caused by RO injection. One opponent cites the general negative health effects that may result from RO injection: "We are concerned about the public health aspects that have not been fully explored" (*Tri-Valley Herald*, 13 September 1998, Local-2). References to specific harms are especially common in public testimony in the first period and include reproductive harm, birth defects, degenerative diseases, cancer, and immune suppression. For instance, one member of the public testified before the Pleasanton City Council that "he would hold the City Council responsible if his future grandchildren were born with birth defects" (Pleasanton 1998b, 12). Another, testifying before the water board, "expressed concern for immune deficient people and those on kidney dialysis" (Alameda County, Zone 7 Board of Directors 1998b, 5). During the second and third periods, general references to health threats continue (although fewer than in the first period), but there are far fewer references to specific health threats (see table A2). The drop in references to specific harms to public health after the first period may have several causes. One cause may be the difficulty of supporting claims of connections between specific contaminants and specific harms after the release of water-quality data from the 16-weeks test in the second period. Another may be a decrease in testimony by members of

the general public in the second and third periods. Specific health threats seem to have been more prevalent in the public testimony at the outset of the controversy, when public debate attracted more members of the public given to more impassioned claimsmaking.

Public health threat arguments are characteristic of the rhetoric of endangerment, which expresses the individual's right to be free from bodily harm (Ibarra and Kitsuse 1993, 39). According to Ibarra and Kitsuse, these arguments are most persuasive when grounded in scientific knowledge, as they are in the first period when members of the Safe Water Committee (Cooper et. al 1998) argue in their paper "Public Objection to Reverse Osmosis Treatment of Sewage and Issuance of an Injection Permit" that specific contaminants potentially found in RO-treated water may result in specific harms to public health.

Economic and Financial Harm Claims: Opponents

Another prominent class of arguments citing harms resulting from RO injection include arguments referring to economic and financial harms. Economic harms include damage to property values or damage to the region's ability to attract and keep businesses; financial harms include the cost of the RO injection project itself, as well as cleanup costs that might result from any contamination of the aquifer. Economic harm arguments, the more common of the two types of

arguments, are more prevalent in the first sampling period than in the second or third; financial harm arguments are also less numerous in the second and third sampling periods. During the first sampling period, both types of arguments are more common in public testimony, which, because of the relative lack of public testimony in later sampling periods, may explain their decrease in the second and third periods.

In contrast to public health threat arguments, which assume the contamination of the basin, several of the economic and financial harm arguments do not assume contamination. Among this group of arguments are both types of economic harm arguments. According to opponents, the mere association of the City of Pleasanton with recycled sewer water may both decrease property values and discourage businesses from locating there. The following quotations from the first and third sampling periods reflect the connection between the negative city image resulting from RO injection and economic harms:

> Morrison added that he feels property values could fall and businesses in Pleasanton could suffer if the community becomes known as a place where recycled water is used for drinking. (*Tri-Valley Herald,* 9 February 2000)

> He asked who would be responsible if something does happen. . . . He said people will not want to live in Pleasanton and believed property values will go down. (Pleasanton 1998b, 7)

Of the two types of financial harm arguments, one assumes the contamination of the basin and the other does

not. The first type of argument cites the potential cleanup costs in the case of contamination. Several opponents express their displeasure that the public might be stuck with the financial liability for cleanup and suggest that DSRSD be required to post a bond to cover any potential costs associated with contamination. The following two excerpts from the "Minutes" of the Pleasanton City Council in the first sampling period reflect public concern over the harm posed by potential liability for cleanup costs:

> DSRSD and Zone 7 have not accepted full financial responsibility if something goes wrong. The developers are dreaming if they want both water and sewer capacity at the public's expense and risk. (Pleasanton 1998b, 7)

> She believed the question of future liability had not been addressed and who would pay the clean up costs if the water tables become contaminated. (Pleasanton 1998b, 8)

Unlike the financial liability argument, the second type of financial harm argument is not dependent on the contamination of the basin. Instead, it focuses on the cost of the project itself, a cost which opponents argue is not justified by benefits claimed by proponents of RO injection. Opponents label RO injection an "inappropriate use" of RO technology and a waste of money. Some suggest alternative uses for RO water, such as landscape irrigation and agriculture. The following quotations from the first sampling period reflect concerns over cost and over whether RO injection is the appropriate use for RO water:

> The project is not needed--it is too expensive and the people are overwhelmingly opposed. . . . (Alameda County, Zone 7 Board of Directors 1998b, 15)

> RO will only increase water costs in Dublin and for the rest of the Valley. . . . If additional water supplies are needed, he urged that surplus water be purchased and RO be used for landscape irrigation or agriculture. (Alameda County, Zone 7 Board of Directors 1998a, 8)

Treatment and "Purification" Claims: Proponents

Proponents counter arguments citing the possible contamination of the basin with arguments referring to the effectiveness of the RO treatment process. These arguments focus on such aspects of the treatment process as source control, monitoring, safeguards, and the efficacy of RO technology itself. The following quotations, in their respective order, represent examples of the four types of treatment process arguments:

> DSRSD has indicated that there is less risk of a significant uncontrolled discharge to the wastewater collection systems (due to source control programs) that would affect the RO water quality than to the Valley's water supply that could result from uncontrolled discharges into the Sacramento-San Joaquin river basin. . . . (Pleasanton 1998a, 10)

> The monitoring program has been extensively reviewed. . . . The monitoring program requirements include schedules for the following: TOC [Total Organic Carbon], bacteriological, total coliform, nitrogen, Carbonaceous Biochemical Oxygen Demand, general physical and mineral characteristics, inorganic chemicals, specific organic chemicals, gross alpha and gross beta particle activity, and turbidity. (Pleasanton 1998a, 11)

> Operation of the plant is the biggest risk. However, on-line monitoring will shut the system down if problems occur. (Alameda County, Zone 7 Board of Directors 1998a, 12)

> Both water treatment processes together can catch the pollen, bacteria and viruses. But water molecules, and almost nothing else, would pass through. What you end up with is a source of water nearly as pure as you can get. (*Tri-Valley Herald*, 13 September 1998, Local-2)

Treatment process arguments by proponents are prevalent arguments in all three sampling periods (see table A3). During the first period, all types of treatment arguments are numerous, especially those emphasizing the effectiveness of RO filtration technology, the adequacy of safeguards, and the soundness of the monitoring program to ensure compliance with water quality standards. For instance, a DSRSD engineer states in a letter to a state regulator, "Such a small contribution to the water supply in conjunction with the high level of treatment and monitoring, virtually eliminates any real risk" (Requa 1998).

Beginning in the second sampling period and continuing into the third, treatment process arguments change to reflect the public relations program sponsored by DSRSD. The most important change from the first period is the increased use of language describing RO water as "pure" or "purified" and RO treatment as "purification." In effect, proponents respond to arguments citing the possible contamination of the basin by couching the RO treatment process in language that suggests that not only is RO water not sewage, as opponents

claim, but that it is pure. Treatment process arguments in the second sampling period further reflect the emphasis on RO's capacity to purify water by focusing on the characteristics of filters that enable them to capture viruses and on the multiple safeguards preventing contamination. The following excerpt from a DSRSD brochure illustrates the connection that proponents draw between RO and "purification":

> Reverse Osmosis (RO) is the second treatment barrier in purification to remove any remaining impurities from the microfiltered water. With RO, the water is pumped through spiral-wound membranes with pores so small that only water molecules themselves can pass through. (Dublin San Ramon Services District 1999a)

The previous argument, which counters the opponent argument that RO water may contaminate groundwater supplies by citing a faith in scientific techniques, is a manifestation of the rhetoric of endangerment in proponent claimsmaking. Proponents claim that any potential harms derived from the contamination of the basin, in particular threats to public health, are countered with prevention based on expert judgment and practice (McMullan and Eyles 1999).

"Scientific Test" Claims: Proponents

In addition to promoting the treatment process, RO proponents counter opponents by citing, conducting, and publicizing water quality tests. Generally, these tests measure impurities in RO-treated water according to pre-

identified parameters and compare the levels of impurities in the samples to regulatory standards. Arguments that RO water meets standards for drinking water are common arguments in all three sampling periods (see table A3). By providing concrete, scientific evidence of water quality as measured against regulatory standards, these tests help explicitly to confirm proponents' claims of the safety of RO water and serve implicitly to legitimate the scientific authority of decision makers.

Proponents frequently employ arguments citing scientific studies, especially in the first two sampling periods (see table A3). In the first sampling period, proponents refer more frequently to tests conducted on water from other RO projects. In the following Zone 7 memorandum, proponents refer to data from tests conducted elsewhere as evidence of the safety of RO water: "In communities using reclaimed water where analytical testing, toxicological testing, and epidemiological studies have been conducted, significant health risks have not been identified" (Zucca 1998, 2).

In the second sampling period, the references to water-quality tests focus on the data produced by DSRSD's 16-week test-run of its newly constructed RO plant. Many of these arguments refer to the panel of four university-affiliated, water-quality and engineering experts who were contracted to oversee the tests and confirm the validity of their results.

In the following excerpt from a DSRSD cover letter sent to Tri-Valley residents, a DSRSD board member draws the connection between water quality test results, validation by experts, and the safety of RO water:

> Results of a just-completed rigorous testing program show that a new water purification plant in Pleasanton is operating as expected. . . . An independent technical review panel composed of University of California scientists and engineers confirmed that the plant is producing water that is purer, safer and higher in quality than the untreated Delta water currently being added to our groundwater supply. (Vonheeder-Leopold 1999)

Water Quality Comparisons: Proponents

In addition to claiming that RO water meets standards in accordance with the regulatory approval process, proponents use scientific data to compare the quality of RO-treated water with water from other sources. Arguments comparing RO water with water from other sources are common in all sampling periods. The following quotation from a DSRSD informational brochure in the second period illustrates both the standards and water quality comparison arguments: "The test results show that not only does the purified water comply with the most stringent state and federal drinking water regulatory standards, but it is also of equal or better quality than samples taken from five homes served also [sic] by municipal water systems in the Valley" (Dublin San Ramon Services District 1999a).

Although common in all periods, water-quality-comparison arguments become more diverse over the course of the controversy. In the first sampling period, most water quality comparisons are between RO water and Delta water, which is delivered through the State Water Project and is used to recharge aquifers in the Tri-Valley. As part of their public relations program in the second sampling period, proponents compare RO water quality to the quality of Delta water and other water sources, including valley tap water and bottled water. In the second sampling period, DSRSD writes in a public relations pamphlet:

> Compared with Reverse Osmosis (RO) purified water, water from the Delta has 6 times as much salt and 5 times as much organic material. Groundwater has 10 times as much salt and about the same organic material. (Dublin San Ramon Services District 1999c)

Water quality comparisons are significant proponent arguments for several reasons. First, they allow proponents to cite water quality data, such as total organic carbon (TOC) and total dissolved solids (TDS), to argue that the relative risk of RO water is lower than the risk of other water sources. This type of argument is used several times in the second period, drawing on comparisons between RO and other water sources as part of the 16-weeks test. A second important reason that proponents cite water quality comparisons is to counter arguments by proponents that unknown contaminants present in the sewer water feedstock may escape filtration during RO treatment and contaminate the

aquifer. Proponents argue that it is equally probable that these contaminants are already present in the aquifer and in Valley tap water because Delta water receives minimally treated waste water from San Joaquin Valley communities as it makes its way south from the Delta. Comparisons between RO water and Delta water help proponents respond to the "ick factor" present in many opponent arguments that emphasize distaste with sewer water as the source of RO-treated water; that is, proponents argue that opponents should be even more concerned about the relatively-untreated sewer water present in the Delta water. The following letter-to-the-editor from the third sampling period illustrates how proponents use comparisons with water from the Delta to respond to concerns over sewage as the source of RO water:

> How can anyone be serious about fighting reverse osmosis and then think nothing of drinking water from the tap? Don't they know that water we drink from the Delta is comprised of sewage from Sacramento, Stockton and other cities? (*Valley Times*, 4 March 2000, 15a:2)

"Other Projects" Claims: Proponents

Closely related to arguments citing scientific tests are arguments referring to other RO projects. Proponents cite the existence of other, unproblematic RO injection projects in different locations as evidence of the safety of RO injection. These arguments help to counter opponent arguments that not enough is known and that long-term epidemiological

and toxicological tests should be required prior to the permitting of DSRSD's project. In the following newspaper quotation from the first sampling period, a Southern California water quality manager testifies to the safety of RO water: "For the 20 years or so that the Water Factory has been treating water, it has been tested every day, and every day it has met or exceeded (drinking) water quality standards" (*Tri-Valley Herald*, 13 September 1998).

In the second sampling period, references to other projects are strategically incorporated into DSRSD's public relations program. DSRSD published a brochure listing other RO projects and other water recycling projects across the nation. Referring to an RO injection project in Orange County, DSRSD markets RO water as the water that "thousands of tourists who visit Knott's Berry Farm and Disneyland have been drinking . . . for many years" (Dublin San Ramon Services District 1999b).

In short, both opponents and proponents engage in the rhetoric of endangerment in all three sampling periods. Opponents employ arguments that cite potential harms to public health and to the economic and financial well-being of Pleasanton and of the Tri-Valley region. Proponents craft arguments that refer to the effectiveness of the proposed RO treatment process, to water quality tests, to water quality comparisons, and to other functioning RO projects.

Rhetoric of Calamity

"Water Scarcity" Claims: Proponents

In addition to arguing that the RO treatment process has been shown to produce safe, pure water, proponents claim that not allowing RO injection poses a far more significant risk to the public than any contamination of the groundwater basin by RO water. The logic of this argument rests on the claim that RO injection represents a new, low-salt water source, without which the region and eventually the state will suffer water shortages that will have severe economic and environmental impacts.

Water scarcity arguments are common across all three sampling periods (see table A3). Beginning in the second period and continuing into the third period, proponents focus their argumentation on the importance of RO as a water source, without which other water-dependent enterprises will be put in jeopardy. These include Lake Del Valle, a storage reservoir and water recreation site, which proponents argue might have to be drained without RO water; agricultural uses, especially vineyards, which require an adequate water source for irrigation; Tri-Valley groundwater, which proponents claim will eventually become too salty to drink without recharge by low-salt RO water; the Tri-Valley economy, whose growth is dependent on acquiring new high-tech manufacturing, an industry dependent on cheap water; and the Delta, an

environmental resource to sensitive fish species, which, without alternative water sources such as RO water, will be drawn down by thirsty agricultural and municipal interests to levels that will not support its fragile ecosystem. In their "Rebuttal Argument to Argument Against Measure J" proponents claim:

> In the absence of reliable new supplies from recycling, the Tri-Valley could easily lose many amenities including: 1) Recreational use of Del Valle reservoir; 2) Increased vineyard plantings; 3) Summer landscape watering in drought years; 4) High paying computer industries requiring superclean water; 5) Reasonable water rates; and 6) Cleaner, better tasting water. (Pleasanton 1999a)

Water scarcity arguments serve as an example of what Ibarra and Kitsuse (1993) term the "rhetoric of calamity." According to this idiom, social problems are couched in terms of a crisis that, if not acted upon immediately, "will result in creating other social problems at an exponential rate, or exacerbate existing ones to the point of intractability" (Ibarra and Kitsuse 1993, 41). In the RO controversy, proponents claim that not going forward with RO injection will result in water shortages that will result in an economic and environmental crisis with wide-reaching effects.

Recycling Claims: Proponents

In promoting RO as a water source, proponents focus on RO water as a form of recycling, much as people might refer to the recycling of other natural resources, such as paper or aluminum. Often accused by opponents of catering to developer

interests (*Tri-Valley Herald*, 27 August 1998), proponents appropriate environmentalist language such as "recycling" to describe RO. In fact, DSRSD titled the project "Clean Water Revival: Recycling for Groundwater Replenishment" when it first formally introduced the project to the public in the summer of 1995.

In the second and third periods, especially in the informational brochures that DSRSD published as part of its public relations program, DSRSD makes even more extensive use of "recycling" language (see table A3). Though not nearly as prevalent as the "RO water as sewer water" motif developed by opponents, proponents develop an "RO as recycling" motif that attempts to create a shorthand description of RO water that draws on the positive associations that the public has with the recycling. For instance, DSRSD writes in a brochure in the second sampling period, "Groundwater replenishment is environmentally responsible because it is a water recycling program" (Dublin San Ramon Services District 1999a).

In short, arguments citing the potential of RO as a recycled water source are prevalent in the second and third sampling periods. Proponents engage in the rhetoric of calamity, arguing that without RO as a new, low-salt water source, the region and eventually the state may suffer economic and environmental crises due to water shortages.

Rhetoric of Unreason

Anti-Growth Claims: RO Opponents

In addition to the harms, both direct and indirect, that opponents claim may result from the contamination of the groundwater aquifer by RO water, opponents focus their opposition on the growth that they claim will result from the increase in wastewater disposal capacity. Anti-growth arguments are prevalent in all sampling periods (see table A2). Growth plays a significant role in the definition of risk, helping to establish the causal connection between risk and harm. Opponents use growth in arguments that claim that decision makers do not merit the trust of the public in their advocacy for RO injection. These arguments take two primary forms: that growth is a hidden or ulterior motive of proponents of RO; and that decision makers are exposing the public to potential risks posed by RO injection for the benefit of the developers. Growth as an ulterior motive is reflected in the following newspaper editorial from the third sampling period: "Under the banner of replenishing and improving the groundwater basin, the promoters of RO are primarily looking for a way to stretch the water supply to facilitate a limitless level of urbanization" (*Independent*, 24 February 2000, 2:1).

The second form of the growth argument--that the public is being exposed to the risks posed by RO injection for the

benefit of developers--suggests distrust in the ability of public officials as decision makers to represent the interests of the broader public against the narrow interests of developers. This distrust in decision-makers is illustrated in the following quotation from a letter-to-the-editor in the first sampling period: "The zone [7 water agency] should not be engaged in diminishing the water basin of its electorate to enrich Contra Costa County developers" (*Tri-Valley Herald*, 27 August 1998). Anti-growth rhetoric in the RO controversy serves as an illustration of the rhetoric of unreason, by which opponents emphasize their concerns over being taken advantage of. According to Ibarra and Kitsuse (1993), the rhetoric of unreason "posits an idealized relationship between the self and the state of knowing," that is undermined by some pernicious influence (40). The resulting lack of information leads to manipulation by external forces. According to RO opponents, the pernicious influences are the self-serving developers and untrustworthy public officials who act as "promoters" of RO, thereby preventing the public from making fully rational decisions that minimize the potential risk of harm to the public. According to the logic of the rhetoric of unreason, education is seen as a way to solve the problem because it is presumed that increased knowledge leads to better action (Ibarra and Kitsuse 1993).

Public Information Claims: Opponents

Arguments criticizing proponents for doing a poor job of informing or educating the public are prevalent, especially in the first sampling period (see table A2). These arguments decrease during the second sampling period, probably because of the extensive public relations program and water quality testing program (16-weeks test) conducted by DSRSD, only to pick up again somewhat in the third sampling period. Arguments citing an inadequate informing of the public are used to help establish the causal connection between the object (RO technology) and the harm. In the following quotation from the first sampling period, the harm is damage to the local economy and the causal connection is an inadequate public process by which RO injection as the risk object is being forced on an uninformed public:

> Ms. Pat Stillman, Sunol, expressed her concern over the process which is being followed. The public has not been kept informed and does not understand the issues. She speculated on what it would do to the local economy when it had to be disclosed to newcomers that they would be drinking reclaimed wastewater if they move to this Valley. (Alameda County, Zone 7 Board of Directors 1998a, 7)

During the second period, arguments calling for a better informing of the public are replaced by arguments criticizing proponents for conducting a "slick" public relations campaign (see table A2). The nature of the criticism against the public officials, who act as "promoters" of RO, changes in

the second period, targeting the quality of information (according to some not information at all, but "PR") instead of an inadequate quantity of information. In the following quotation from the second sampling period, opponents state their concerns over potential threats to the public health from RO injection, which they claim is falsely promoted by PR people as safe:

> The PR people claim no one has gotten sick or died from this. Yet the NRC [National Research Council] cites a number of studies that came to no conclusion because it was hard to quantify the dose. So there really is no proof that it's safe. (Alameda County, Zone 7 GMAC 1999, 9)

Anti-Technical Claims: Opponents

According to Ibarra and Kitsuse (1993), the rhetoric of unreason implies that certain categories of people who are more vulnerable to manipulation require greater vigilance to protect them from abuse. In the RO debate, this category of people is the public, which stands in contrast to those with technical knowledge. Calls for more consideration of the needs of the "uninformed" public are evident as opponents question the purpose of committees such as the Groundwater Management Advisory Committee (GMAC), a committee established by the Zone 7 Water Agency to give its board public feedback on groundwater issues. Opponents take issue both with the composition of the committee, which they feel has too many members with technical backgrounds, and with the focus of the

committee on technical issues, instead of informing and responding to the concerns of the public. The following quote from the first sampling period illustrates how opponents create an opposition between those with a technical perspective and those with "citizen concerns" to argue that the unbalanced composition of the GMAC contributes to the public's exposure to risk: "She believed that because of the technical makeup of the committee and its commitment to wastewater recycling they have not been willing to discuss the quality of life and the citizen concerns of this project . . . "(Pleasanton 1998b, 13).

Opponent attacks on technical authority extend beyond the composition of committees to technical expertise and to scientific authority. Arguments targeting scientific authority may be classified into two general categories: those that cite past technological accidents as evidence of the fallibility of technical expertise and those that question the superiority of technical knowledge over public perception. Like other arguments that cast doubt on the public's trust in decision-makers (e.g., that decision makers are biased toward the pro-growth interests of developers), anti-technical arguments call into question the public's trust in authorities demonstrating technical expertise, thereby helping to establish a causal connection between their plans for implementing RO injection and potential harms. One common argument cited as evidence of the

fallibility of technical expertise is that scientific authorities originally declared safe the use of MtBE as a gasoline additive only to discover years later that it had led to the disastrous contamination of groundwater supplies in several areas of California. The following citation from the third sampling period demonstrates how opponents use past incidences of real or perceived scientific fallibility to create distrust in scientific expertise in the case of RO injection:

> Mr. David Glenn, Pleasanton, cited other examples of well intentioned solutions turning out to be mistakes: radium injection, lead in paint, MtBE. Experts say RO is safe but this is the same agency that installed lead sewer lines and fouls the air. He didn't trust that DSRSD could clean up its own act. (Alameda County, Zone 7 Board of Directors 2000, 6)

Arguments citing past technical failures serve as an example of Krimsky and Plough's (1987) observation that public conceptions of risk rely on cultural and experiential inputs. In the quotation above, historical and experiential inputs in the form of past technical disasters and distrust-invoking experiences with DSRSD are used by opponents to formulate their conceptions of the risk posed by RO injection.

Early on in the debate over RO injection, arguments targeting the inadequacy of the technical perspective on risk are more numerous (see table A2). During the second sampling period, these arguments decrease considerably. The decrease may either be due to the increased confidence accorded to

scientific authority after the release of results of the 16-weeks test or possibly due to the fact that proponents occupy much of the public space available for claimsmaking with their public relations efforts supporting the efficacy and safety of RO technology. During the third period, arguments challenging the superiority of technical expertise over public concerns increase again, approximating the influence they had in the first sampling period.

Another common technical argument challenges the superiority of technical knowledge over public perception. This second type of anti-technical argument is often used in conjunction with arguments claiming the fallibility of technical expertise. Its basic assumption is that the public possesses a way of knowing that is different and in some cases superior to those practicing technical expertise. One opponent argues that "even the perceived threat of hazards should make this project unacceptable" (*Tri-Valley Herald*, 9 September 1998). Some opponents refer to the public as possessing "common sense," without which, according to opponents, scientific authorities misdiagnose the risk associated with RO injection. In the following quote from the second sampling period, opponents make the connection between the fallibility of technical expertise, the potential harm to the area's groundwater, and the clarifying effect of public perception or "common sense" on the assessment of risk:

> Can you remember when DDT, MtBE, and leaded paint were considered safe? Can you imagine how your life will change if we can no longer use our groundwater? Science must be tempered by common sense. We must learn from past mistakes. (Pleasanton 1999a)

Public Education Claims: Proponents

Like opponents, proponents of RO injection also place a great deal of importance on educating the public. Arguments citing the need to educate the public play an important role in all three sampling periods, particularly in the second and third (see table A3). During the second period, special attention is focused on elements of the public relations program--brochures, tours, and presentation of test results; during the third period, emphasis is placed on public opinion polls conducted by DSRSD that support RO injection, which proponents put forth as evidence of the effectiveness of public relations efforts.

Like opponents, proponents believe that the public is deprived of the information it needs to make well-informed decisions regarding RO injection. However, in contrast to opponents, proponents argue that a lack of understanding about the technology leads members of the public to respond irrationally to RO water as sewer water, what proponents term the "yuck" or "ick" factor. In the second sampling period, DSRSD General Manager Bob Beebe comments that the "district is conducting a public education campaign to get people over

"the yuck factor" associated with drinking water that's been in a sewer . . ." (*Tri-Valley Herald*, 9 December 1999).

By citing the need for public education as a remedy against irrationality on the part of opponents, proponents mirror the opponent argument challenging the superiority of technical expertise over public perception: in effect, proponents dispute the validity of public perception in discourse dominated by technical and scientific claims. Proponents assume that once the public is exposed to rational, scientific arguments in favor of RO injection, the public will reject "less rational" arguments based on perception and emotion. The following quotation, in which a DSRSD official takes issue with the language used to craft the Measure J ballot question, illustrates how proponents of RO injection view the role of factual, scientific information as an antidote to irrational reactions by the public:

> The ballot language should be neutral, otherwise it is like asking a person if they like going to the dentist without ever talking about tooth decay or gingivitis. It is a big job to educate everyone about this subject. He felt it was not fair to discuss this issue without recognizing that the salt content in the groundwater basin is increasing. (Pleasanton 1999b)

Emotionalism Claims: Proponents

In addition to addressing negative perceptions of RO injection with calls for better education of the public, proponents accuse opponents of practicing an emotionalism intended to scare and misinform the public about RO.

Arguments charging opponents with emotionalism may be categorized into two basic types: those claiming that opponents manipulate the public by using scare tactics and misrepresentations; and those claiming that opponents practice an "anti-science" rhetoric based more on emotion than reasoned argumentation. The first category of anti-emotionalist argument focuses more on the deliberate manipulation of public opinion, especially using emotion. For instance, proponents argue that opponent claims regarding the potential for contamination of the groundwater aquifer are scare tactics meant to manipulate public opinion into opposing RO injection. A *Tri-Valley Herald* newspaper editorial comments that "scare slogans like 'Toilet to Tap' are hard to counter" (4 August 1999). Another common argument used in association with accusations of scare tactics is that opponents are misleading the public with misrepresentations of their motives. A frequent charge is that opponents' concerns about the risk of contamination are really motivated by their no-growth politics. A Zone 7 board member reflects on what may have motivated Pleasanton voters to vote so overwhelmingly against RO injection in the March 2000 referendum: "He said Pleasanton voters may have been 'manipulated' by emotion, and by what he said is a Pleasanton political agenda to stop Dublin development" (*Valley Times*, 9 March 2000, 4a:6). In addition to accusations that opponents misrepresent their no-growth motive, proponents accuse

opponents of overplaying the level of public opposition and of using the ballot to delay approval of RO injection by the BRWQCB. In the following quotations, proponents accuse opponents of practicing the misrepresentations mentioned directly above:

> There are probably 50 people in the Valley crying that the sky is falling. The reality is that most people accept it. (*Tri-Valley Herald*, 30 December 1999)

> But officials at [DSRSD] are crying foul, saying the advisory measure proposed by Pleasanton City Councilman Tom Pico is only an effort to delay a water project that has been in the works for years. (*Tri-Valley Herald*, 2 December 1999)

The other category of argument charging opponents with emotionalism includes claims that opponents practice a brand of claimsmaking that is anti-scientific. This brand of argument suggests that arguments against RO, characterized more by emotion and ulterior motives than by reason, are inadequate when compared to the scientific standard of argumentation practiced by some proponents, particularly those in regulatory agencies and other decision-making bodies. In their "Argument in Favor of Measure J", proponents refer to opponent rhetoric as "anti-science" or "'political' science" and comment that the "anti-recyclers are asking you to reject the scientific judgment of the [state regulatory agencies]" (Pleasanton 1999a, 2).

Although arguments accusing opponents of using scare tactics are present in a minor way in the first sampling

period, charges of emotionalism and the use of scare tactics become more prevalent in the second and, especially, the third sampling periods (see table A3). This shift between periods may have several reasons. First, claims against opponents for employing emotionalism may be part of the public relations strategy that is begun in the second period. As such, it may be representative of the evolution of proponent rhetoric from a focus on scientific and data-driven arguments to agonistic arguments that are targeted to the broader lay public. Second, arguments accusing opponents of emotionalism may constitute a response to arguments that attack scientific authority. Just as opponents contrast the validity of "common sense" as public perception of risk with the authority of technical expertise, proponents contrast the validity of scientific authority against emotionalist, 'anti-science' claimsmaking.

In short, both opponents and proponents of RO engage in the rhetoric of unreason. Opponents employ arguments accusing proponents of serving growth interests at the expense of public safety, of doing a poor job of informing the public, and of possessing technical expertise at the expense of common sense. Proponents argue that the public needs more education to overcome irrational responses to RO and that opponents engage in emotionalist, anti-science rhetoric.

The Rhetoric of Entitlement

"More Testing" Claims: Opponents

Despite assertions by proponents that a well-designed treatment process backed up by scientific data assures the safety of RO injection, opponents frequently employ arguments that not enough is known and that more testing is required. Arguments highlighting the unknown and calling for more testing are prevalent in the first sampling period but decrease substantially in the second and especially the third sampling periods (see table A2). The continued presence of arguments citing the need for more testing during the second period, when results of the 16-weeks tests were released, may be due to opponents' assertions that toxicological and epidemiological tests are needed, not water quality tests. The decrease in the third period may be because opponents focus their claimsmaking efforts on disputing proponents' claims regarding the benefits of RO injection, not on calling for more testing.

As stated above, opponents focus on the possibility that unknown contaminants may escape filtration and contaminate the aquifer. In making their arguments, opponents draw on evidence stating that only 20 percent of organic compounds potentially present in sewer water influent have been identified. In contrast to proponents, who measure carbon compounds generically in the form of total organic carbon

(TOC), opponents focus specifically on the possible presence of unknown and unidentifiable compounds. Citing statements in a National Research Council (1998) report suggesting the necessity of further study of RO-treated water, opponents argue that long-term toxicological and epidemiological tests should be required prior to injection. In the following quotation from the second sampling period, members of the Safe Water Committee explain how the possibility of unknown chemicals in RO-treated water necessitates further scientific study, without which the public risks exposure to contaminants:

> The proposal to use treated sewage, which contains many unknown and uncontrolled organic contaminants . . . raises serious concerns about public safety. For this reason, it would seem prudent to avoid exposing large human populations to these potential toxic pollutants without previously carrying out large-scale animal studies . . . . (Cooper et. al 1998, 9)

"Experimentation" Claims: Opponents

Opponents further express their concerns over possible exposure to unknown contaminants by claiming that public officials are experimenting on them with unknown contaminants that opponents believe to be present in RO-treated water. One member of the public states, "Zone 7 and Dublin San Ramon Services District have effectively volunteered Tri-Valley residents as the test population" (*Valley Times*, 31 August 1998, A11:4). Experimentation arguments are present in the

first sampling period but taper off during the second and third periods (see table A2). DSRSD's presentation of scientific data on RO water quality from the 16-weeks test in the second sampling period may have acted to decrease the effectiveness of arguments claiming that the public is subject to experimentation with unknown contaminants.

Opponents' claims that they are subjects of experimentation reflect distrust in decision makers. This distrust reflects both the antagonism between technical experts and the public, as well as the perception that the public is being exposed to risks posed by RO injection for the benefit of developer interests. Additionally, experimentation arguments reflect a distrust in public officials motivated by the perception that they are uncautious and unfeeling to public concerns. As stated above, the distrust represented by claims of experimentation on the public helps to construct the causal connection between RO injection as a risk object and contamination of the groundwater and threats to public health as harms. The following quotation from the first sampling period illustrates the connection between the different factors motivating distrust and potential harms:

> So the question is why current residents should serve as test animals for an unproven and potentially dangerous technology when they will receive largely negative impacts and minimal benefits . . . . It would be irresponsible in the highest degree to act without a better knowledge of the risk involved. (Cooper et.al 1998, 11)

The reference in the quotation above to the public as "test animals" is an example of a "guinea pig" motif which opponents use to characterize themselves as victims of experimentation by decision makers. For instance, in the "Argument Against Measure J" opponents ask, "Why should we be Guinea Pigs [sic] for the testing of this technology merely to supply sewage capacity for new development?" (Pleasanton 1999a) The "guinea pig" motif is employed in a minor way in all three sampling periods.

Experimentation arguments reflect the rhetoric of unreason, which, as discussed above, embodies arguments by claimsmakers who maintain that they are being manipulated or taken advantage of. Additionally, though, experimentation arguments reflect what Ibarra and Kitsuse (1993) term the rhetoric of entitlement, which encompasses arguments expressing a desire for equal institutional access for all (38). Opponents employ experimentation arguments to express their frustration with their inability to have greater influence over the decision-making process, especially in the final determination whether or not to implement RO injection[11]. In absence of the ability to participate more fully in the final decision over RO, opponents feel themselves to be captives, like "guinea pigs," of decisions

---

[11] Complicating matters, Pleasanton residents, although they receive services from DSRSD, do not elect a representative to its board.

which they believe expose them to the risks of RO injection for developer gain.

Public Input Claims: Opponents

The rhetoric of entitlement is even more clearly evident in calls by opponents to decide the issue of RO injection by ballot initiative. Arguments citing the need for an RO initiative are prevalent in all three sampling periods, decreasing a bit in the third period, probably because the vote on RO is imminent (see table A2).

Arguments calling for a ballot initiative on RO injection are based on two assumptions: that the public can provide a better determination of the risk posed by RO injection than can technical experts; and that the public will better represent its own interests against developer interests than will public officials. Both assumptions reflect a distrust in decision-makers that helps to construct the causal linkage between RO injection as a risk object and potential harms: in other words, untrustworthy public officials are more likely to make decisions that expose the public to harm from RO injection. The following quotation from the third sampling period illustrates both the distrust in technical experts and the distrust in decision makers to represent the interests of the public against developer interests:

> The people should make decisions not bureaucrats or technocrats. We cannot forget that a few years ago MtBE was touted as a cure for air pollution. The public is asking Zone 7 to listen to its constituents--not monied interests. The people have a right to say they don't want to be a part of this. (Alameda County, Zone 7 Board of Directors 2000, 6)

Other more minor claims for more public input go beyond calling for an initiative to attacking other aspects of the public decision-making process, including the lack of Pleasanton representation on the DSRSD board and, more importantly, the Bay Regional Water Quality Control Board's (BRWQCB's) decision to approve the injection permit prior to the initiative. Criticisms of BRWQCB's early approval of the RO injection permit are limited to the third sampling period when the BRWQCB announced its intention to approve the permit prior to the ballot initiative on RO injection. Like calls for a initiative, arguments criticizing BRWQCB's early approval reflect a distrust in decision makers, which, in this case, results from the perception that public officials have subverted Zone 7's authority to manage the aquifers and have subverted the democratic process. In the following quotation from the third sampling period, a Zone 7 Board member comments on BRWQCB's early approval of RO injection: "To grant any other agency the right to directly inject anything into the basin, over the objections of residents and over the objections of the ground-water manager, would be

tantamount to a subversion of the electoral process . . ." (*Valley Times*, 17 February 2000, 3a:1).

In summary, opponents engage in the rhetoric of entitlement, arguing that they have been denied equal institutional access for the purpose of deciding whether to implement RO injection. They argue for more testing of RO water, without which, they believe themselves to be the subjects of experimentation with a risky technology. Further, they claim the necessity of allowing the public to more fully participate in the ultimate decision to implement RO through a ballot measure.

The Social Construction of Risk

Risk-related claimsmaking in the first sampling period of the RO conflict has elements that reflect the first two stages in Hannigan's (1995) social construction model: assembling the claims and presenting the claims. The assembling of claims represents the "initial discovery and elaboration" of the social problem; the presenting of claims represents the need to command attention and to legitimize the claim (Hannigan 1995, 41-45).

Claims by opponents in the first sampling period are characterized by both the scientific style, which, according to Hannigan (1995), is more typical of the initial assembling of claims, and by the civic style, which is more typical of the succeeding stages. The scientific style is reflected in

arguments made in Safe Water Committee's (SWC's) initial position paper "Public Objections to Reverse Osmosis Treatment of Sewage and Issuance of an Injection Permit" (Cooper et. al 1998), in which activists employ arguments based in scientific reasoning to establish the potential for harms posed by RO injection, as well as to establish the causal connections between RO technology and the harms. For example, members of the SWC write, "As the filtering membranes act by allowing less polar materials (including water) to pass while excluding more polar, ionic materials (such as salts), the presence of nonpolar contaminants including many organic compounds in the feedstock causes concerns about incomplete removal of these potentially toxic materials" (Cooper et. al 1998, 9). The use of a scientific claimsmaking style early on by opponents may also demonstrate their need to establish themselves as authoritative sources of information, which Hannigan (1995, 45) points out is important for establishing the legitimacy necessary to present the claim.

The civic claimsmaking style, which is characterized by moral outrage and an unstylized presentation of claims, is represented in the more impassioned claimsmaking of newly mobilized members of the public, especially in letters-to-the-editor and in testimony at public fora. The civic style is most apparent in arguments citing potential harms to public health, as well as in those reflecting outrage over

what opponents see as a bias toward developers. The following quotations serve as examples of the civic claimsmaking style in the first sampling period:

> I find it disgusting that the Zone 7 Water Agency may soon force me to drink and bathe in my own "cleaned-up" waste. I can't even begin to say how I feel about drinking the waste from the Lab, the hospitals and other facilities. (Tri-Valley Herald, 4 September 1998)

> He asked why should the City of Pleasanton try a potentially dangerous process and risk contamination of the groundwater to provide for growth within neighboring boundaries. He thought the health of Tri-Valley citizens was far more important than the development interests of a select few. (Pleasanton 1998a, 7)

Claims by proponents in the first sampling period are almost entirely reflective of a scientific claimsmaking style, which is in keeping with their mandate as a public agency to use bureaucratic processes and a practical application of science to serve the public. In the first sampling period, proponents emphasize aspects of the RO treatment process, such as the efficacy of RO filters, the monitoring and safeguards program, and the conformity of RO water to water-quality standards. The following quotation from a DSRSD engineer in the first sampling period illustrates the scientific style in proponent claimsmaking:

> The process will eliminate bacteria and harmful elements. The water put into the groundwater meets every drinking water standard and in fact is better quality than most valley water supplies (Pleasanton 1998a, 3)

The second sampling period in the RO controversy more fully represents the stage Hannigan (1995) terms "the presenting of claims." Changes in the rhetorical practices of claimsmakers between the first and second sampling periods result primarily from actions taken by proponents, which include the hiring of consultants to undertake a public relations program and to conduct and publicize results of the 16-week trial run of RO water produced at DSRSD's new facility.

The primary change between periods is a shift in claimsmaking styles, especially on the part of proponents. Although not included in Ibarra and Kitsuse's (1993) typology of claimsmaking styles discussed above, the most accurate characterization of the claimsmaking style of proponents in the second sampling period is a mixture of a "public relations" claimsmaking style with a scientific claimsmaking style. In contrast to the precise, technical language of a scientific style and the unstylized language of moral outrage characteristic of a civic style, a public-relations style employs a stylized language that draws on the positive associations the broader public has with an idealized typification--in this case, with the purity of nature. The treatment process is marketed to the public, especially in brochures and informational mailings, as "natural" forms of "purification" and "recycling." The following quotations from

DSRSD brochures in the second sampling period illustrate how proponents market the RO process:

> Groundwater replenishment is the process of adding purified recycled water to the local groundwater supply. (Dublin San Ramon Services District 1999a)

> Once in the groundwater supply, the RO purified water is naturally filtered through layers of sand and gravel. The RO purified water, now mixed with groundwater, undergoes this additional natural filtration for at least five years before the mixed water is drawn out as drinking water. (Dublin San Ramon Services District 1999b)

In the second period, proponents also begin a more systematic presentation of their argument that rejecting RO will result in water scarcity that will have broader deleterious effects on recreation, agriculture, and industry in the Tri-Valley. One DSRSD board member writes the following in a cover letter to Tri-Valley residents:

> Local agencies predict that, without reverse osmosis treatment and groundwater replenishment, in 10 years our groundwater will be too salty to drink. State water officials also predict that without additional supplies, our Valley will not have enough water during the next drought. (Vonheeder-Leopold 1999)

"Purification" and water scarcity arguments are typical of a broader class of arguments that are crafted to resonate with the desires and fears of the public. This class of arguments includes those accusing opponents of using scare tactics, emotionalism, and other misrepresentations, all of which are employed more systematically in the second sampling period. In short, proponents seem to use their public relations program in the second period to accomplish ends

similar to those achieved by opponents in the first period with their civic claimsmaking style: namely, to communicate agonistic arguments resonant with the values and emotional sensibilities of the broader lay public.

In addition to employing a public-relations claimsmaking style in the second period, proponents of RO injection continue to make effective use of the scientific claimsmaking style, especially as represented in arguments referring to the 16-weeks test. Specifically, proponents cite scientific data from the test to prove that RO water from DSRSD's new plant will conform to regulatory standards. They also use data to give scientific confirmation to their argument that RO water will have fewer contaminants than Delta water currently being used to recharge Tri-Valley aquifers. The following excerpt from a newspaper article in the second sampling period shows the continued use of the scientific style by proponents:

> Other findings showed "a multiple virus barrier greater than the state criteria," another good thing. The study also cites low carbon levels and that the samples were "equal to or better than comparative water supplies in the valley." (Valley Times, 7 October 1999, 5a:1)

In the second sampling period opponents continue with many of the same themes they use in the first sampling period to characterize potential harms and to connect those harms with RO injection. However, a noticeable effect of the 16-weeks test on claimsmaking by opponents seems to be the

decreased prominence of the scientific claimsmaking style in opponent rhetoric. Although opponents continue to argue generally that not enough is known about RO water and that more testing is needed, they make fewer arguments citing known and unknown contaminants, citing potential health effects, and questioning aspects of the treatment process (see table A2). A further effect of the 16-weeks test seems to be a strengthening of the scientific authority of public officials, as represented by a decrease in arguments citing the inadequacy of the technical perspective and by a decrease in arguments accusing decision makers of experimenting on the public.

The third sampling period represents the continuation of claimsmaking styles and lines of argumentation developed in the first and, especially, the second period. In particular, proponents continue to argue that the safety of the RO treatment process is confirmed by results of the 16-weeks test, to argue for the benefits of RO as a water source, and to argue that opponents practice an emotionalist rhetoric that uses scare tactics to manipulate public opinion (see table A3). The following three arguments illustrate the continuation of agonistic arguments and of scientific and public relations claimsmaking styles in the third period:

> McDonald downplayed the significance of the advisory election, which he said is based less on science than on emotion, scare tactics, and no-growth politics. (*Valley Times*, 29 February 2000, 3a:5)

> The RO system contains four redundant filtration barriers. Comprehensive testing of product water from the RO plant has demonstrated RO water far exceeds drinking water quality standards for every constituent. (*Valley Times*, 26 February 2000, 25a:1)

> The district said the resulting water would be as pure as Sierra snowmelt, and of better quality than what the valley now gets from the Delta and what people now buy in stores. (*Valley Times*, 8 March 2000, 1a:1)

Claimsmaking in the third sampling period also reflects aspects of the third stage in Hannigan's (1995) social construction model, which he terms "the contesting of claims." In contrast to earlier stages, in which claimsmakers seek to identify and communicate the social problem to the public, the most important characteristic of claimsmaking in the third and final stage of Hannigan's (1995) social construction model is that it seeks to effect long-term institutional change in legal or political arenas. In the case of the RO controversy, the third period encompasses debate over Pleasanton's non-binding ballot initiative on the use of RO injection, which opponents anticipate will demonstrate public opposition at a level that would effectively tie the hands of public officials hoping to implement RO injection. In the following quotation from a water board meeting, one member of the public expresses her desire to stymie the efforts of DSRSD officials:

> The reason DSRSD is pushing this project is because DSRSD needs more sewage capacity. She urged that the voters say no to DSRSD and to RO on March 7. (Alameda County, Zone 7 Board of Directors 2000, 4)

Although opponents do not employ a scientific claimsmaking style anything like that employed in the first sampling period, claimsmaking by opponents in the third sampling period represents a resurgence of lines of argumentation that diminished in the second sampling period. There is a resurgence of arguments criticizing the RO treatment process as inadequate, of arguments citing the possibility of unknown contaminants in RO-treated water, and of arguments targeting technical expertise as fallible (see table A2). The following quotation in the third period illustrates the resurgence of arguments from the first sampling period:

> While critics concede reverse osmosis technology is good, they say system failure or human error could contaminate the valley's entire ground water basin. And although tests of water treated at Dublin's $17 million plant showed no harmful contaminants, skeptics worry about unknown compounds. (*Valley Times,* 29 February 2000, 3a:5)

Additionally, opponents dispute arguments citing the necessity for and adequacy of RO water as a safe, viable alternative water source. The following quotation from an anti-RO editorial written by a Zone 7 board member serves as an example of arguments disputing the necessity of RO as a water source:

> Proponents say that a no vote will bring "permanent water scarcity," "higher prices," "lower water quality" and "without new supplies from recycling," we will "lose the recreational use of Lake Del Valle." All of those statements are false; misrepresentations that demonstrate that they will

> say anything to get you to vote for their project. (*Valley Times*, 26 February 2000, 25a:1)

In short, opponent arguments in the third period seem to focus on dissuading the public of the benefits of RO as a water source as claimed by proponents and on returning to arguments critical of the RO process in particular and of scientific expertise in general.

CHAPTER V

DISCUSSION AND CONCLUSIONS

McMullan and Eyles (1999) studied claimsmaking and the social construction of risk in a controversy over the allowable standards for tritium in drinking water in Ontario, Canada. Their key finding was that claimsmaking by both proponents and opponents of the revised higher standard was characterized by "rhetorical idioms and claimsmaking styles that reinforced and legitimated core values and interests." Claimsmaking by proponents of the higher standard, who included the Canadian Minister of the Environment and representatives of the Ontario hydroelectric industry, reflected the rhetoric of endangerment and a scientific style of claimsmaking. Specifically, proponents used a sober, technical claimsmaking style to argue that threats to public health were paramount but that they could be prevented with expert judgment and practice. On the other hand, claimsmaking by opponents, who included environmental activists, was typified by the rhetoric of loss and the rhetoric of calamity. Although opponents employed a scientific claimsmaking style, they relied more heavily on a civic claimsmaking style combining emotion and moral indignation to argue that potential tritium contamination was both a threat to the moral value of the purity of nature and a potential

cause of utter disaster to public health, the environment, and the economy.

Results of this study of claimsmaking and risk construction in the RO controversy in Pleasanton, California, both coincide with and differ from the findings of McMullan and Eyles (1999) in several key areas. One of the key similarities is the reliance of proponents, who in both studies include officials from public or private institutions, on the rhetoric of endangerment and on a scientific claimsmaking style. In the RO controversy, proponents also assume the primacy of the risk to public health from contaminants potentially found in RO water, which they address through arguments citing the adequacy of the treatment process, of scientific tests, and of regulatory requirements. An additional similarity between findings in the two studies is the reliance of opponents, who predominantly include environmental activists in both controversies, on the rhetoric of loss and on a civic claimsmaking style. In the case of RO, opponents use their doubts about scientific expertise, as well as scientific arguments of their own, to register their moral outrage that potential known and unknown contaminants may irreversibly contaminate a pristine basin.

One of the chief differences between the two studies is the use of the rhetoric of calamity by proponents of RO injection. Especially, in the later stages of controversy, RO

proponents argue that the water shortages that will result from not proceeding with RO injection will have disastrous effects on recreation, agriculture, industry, and the environment in the Tri-Valley region. Another key difference between findings of the two studies is the reliance of opponents in the RO controversy on the rhetoric of unreason and on the rhetoric of entitlement. RO opponents argue that public officials, whose ulterior motive is to facilitate the growth desired by developers, are deceiving the public about the risks posed by RO; furthermore, they demand that the public be allowed to decide by referendum whether to employ RO injection. A final difference between the two studies is the use of a public-relations claimsmaking style by proponents of RO in the final stages of the controversy. Proponents of RO co-opt environmental arguments, marketing RO as a "natural" purification process that represents another form of recycling.

There may be several reasons for the differences between findings in the McMullan and Eyles' (1999) study of the tritium controversy and this study of the RO conflict. First, these controversies are carried out in different arenas. The tritium controversy is primarily undertaken at the federal level before Canadian ministries; the RO conflict, though it includes the involvement of environmental and public health regulatory agencies, is primarily carried out in local arenas, including the city council and local water agency

meetings. The result of this difference may be that proponents of the higher tritium standard were more immune from public pressure than proponents of RO injection, who consequently adopted rhetorical strategies, such as the rhetoric of calamity and a public-relations claimsmaking style, that were more resonant with the broader lay public. In fact, the Bay Regional Water Quality Control Board, which granted the final injection permit to DSRSD, required that the sewer agency undertake serious efforts to gain more support for RO injection from the public.

A second important reason for the different conclusions of the two studies may be the role of growth as an issue in the RO controversy. In addition to concerns over the opposition to contaminants potentially present in RO-filtered waste water, proponents of RO had to contend with opponents who were utilizing anti-growth rhetoric in an affluent region known for support of environmental causes. The force of anti-growth arguments may have forced proponents out of rhetorical idioms and claimsmaking styles typical of public officials who practice bureaucratic, scientific discourse into those more resonant with the values of the broader lay public. In the case of opponents, anti-growth arguments constitute the major thrust behind their use of the rhetoric of unreason: essentially, opponents claim that public officials are promoting an unsafe technology to serve development interests. Additionally, anti-growth arguments play a central

role in the use of the rhetoric of entitlement: namely, opponents argue that deciding the RO controversy by ballot measure would allow the public to better represent its interests against those of developers and technical experts.

In conclusion, claimsmakers in technical controversies employ rhetorical idioms and claimsmaking styles that reflect their core values and interests. As was evident in the case of reverse osmosis, claimsmakers may also adopt the rhetorical strategies more typical of their opponents, usually with less success. This ineffectiveness may be due to the efforts of opponents to defend their core idioms and claimsmaking styles. For instance, the scientific style employed by opponents of RO in the first period was employed with less certainty and less effect in succeeding periods, especially after the release of water quality data. The rhetoric of calamity and the public relations claimsmaking style employed by proponents in the last two periods of the conflict were ineffective, especially if judged by the results of the non-binding ballot initiative and the ultimate defeat of the RO injection process. Opponents were ultimately successful in using the rhetoric of unreason to cast doubt about the safety of RO and the trustworthiness of the public officials who proposed it.

Findings from the RO controversy in Pleasanton, California, suggest several areas for future study. One important problem is the role of quality-of-life issues such

as growth in the risk definition process. This study suggests that in the case of the RO controversy anti-growth arguments were used to help construct the opponent definition of risk. Future studies might concern themselves with the question of whether quality-of-life issues such as growth constitute a facet of the risk definition process or are themselves separate social problems that evolve through a social construction process of their own.

An additional topic for future study is the issue of risk-related claimsmaking and social location. My own study suggests that it was difficult for both proponents and opponents of RO to deal effectively with issues outside their core idioms and claimsmaking styles. The technical responses of proponents were inadequate for addressing the issues of growth and trust. Likewise, opponents appeared to be unsuccessful in their attempts to make convincing use of scientific arguments. Future study might focus specifically on claimsmaking by either proponents or opponents. One might study how different categories of proponents--engineers versus board members, for instance--addressed the issues of growth and trust.

Finally, this study has implications for the study of environmental problems. Primarily, this study points to the usefulness of the social constructionist approach to the study of environmental problems. Some environmental conflicts, like many technological conflicts, are problems

stemming from competing values, conflicting perceptions, and different means of definition.

WORKS CITED

Alameda County, Calif. Flood Control and Water Conservation District. Zone 7. Board of Directors. 1998a. *Minutes of the Board of Directors, Special Meeting.* 6 August.

_____.1998b. *Minutes of the Board of Directors, Special Meeting.* 15 September.

_____. 2000. *Minutes of the Board of Directors, Special Meeting.* 8 February.

Alameda County, Calif. Flood Control and Water Conservation District. Zone 7. Groundwater Management Advisory Committee (GMAC). 1998. *Summary Minutes, Groundwater Management Advisory Committee.* 30 July.

_____. 1999. *Notes from Meeting, Results of Dublin San Ramon Services District's Clean Water Revival 16-week Testing Program.* 7 October.

Buttel, F. H. and P. J. Taylor. 1992. Environmental Sociology and Global Environmental Change: A Critical Assessment. *Society and Natural Resources* 5: 211-230.

California Statistical Abstract. 2000. California Department of Finance Publications: Sacramento, CA.

Chenitz, W. C. and J. M. Swanson. 1986. Qualitative Research Using Grounded Theory. In *From Practice to Grounded Theory: Qualitative Research in Nursing,* ed. W. C. Chenitz and J. M. Swanson. Menlo Park, CA: Addison-Wesley.

Clarke, L. B. and W. R. Freudenburg. 1993. Rhetoric, Reform, and Risk. *Society* 30 (July/Aug): 79-81.

Cooper, G., J. Day, T. W. Ford, M. Fulk, P. Purnell, B. Rozsnyai, P. Stillman, and M. Tracy. Safe Water Committee. 1998. *Public Objection to Reverse Osmosis Treatment of Sewage and Issuance of an Injection Permit.* 18 May.

Dake, K. 1992. Myths of Nature: Culture and the Social Construction of Risk. *Journal of Social Issues* 48 (4): 21-37.

Douglas, M. and A. Wildavsky. 1982. *Risk and Culture: An Essay on the Selection of Technological and Environmental Dangers*. Berkeley: University of California Press.

Dublin San Ramon Services District. 1999a. *Clean Water Revival: Recycling for Groundwater Replenishment*. Public relations pamphlet, exact date unknown. Library, Dublin San Ramon Services District, Dublin, Calif.

_____. 1999b. *Facts about Recycling for Groundwater Replenishment*. Public relations pamphlet, exact date unknown. Library, Dublin San Ramon Services District, Dublin, Calif.

_____. 1999c. *Questions & Answers About Recycling for Groundwater Replenishment*. Public relations pamphlet, exact date unknown. Library, Dublin San Ramon Services District, Dublin, Calif.

Fowlkes, M. R. and P. Y. Miller. 1987. Chemicals and Community at Love Canal. In *The Social and Cultural Construction of Risk*, ed. B. B. Johnson and V. T. Covello. Dordrecht, Holland: D. Reidel Publishing Company.

Freudenburg, W. R. 1993. Risk and Recreancy: Weber, the Division of Labor, and the Rationality of Risk Perceptions. *Social Forces* 71 (4): 909-932.

_____. 1996. Risky Thinking: Irrational Fears about Risk and Society. *Annals* (AAPSS) 545: 44-53.

Freudenburg, W. R. and S. K. Pastor. 1992. Public Responses to Technological Risks: Toward a Sociological Perspective. *The Sociological Quarterly* 33 (3): 389-412.

Gerlach, L. P. 1987. Protest Movements and the Construction of Risk. In *The Social and Cultural Construction of Risk*, ed. B. B. Johnson and V. T. Covello. Dordrecht, Holland: D. Reidel Publishing Company.

Hannigan, J. H. 1995. *Environmental Sociology: A Social Constructionist Perspective*. New York: Routledge.

Hilgartner, S. 1992. The Social Construction of Risk Objects: Or How to Pry Open Networks of Risk. In *Organizations, Uncertainties, and Risk*, ed. J. F. Short, Jr. and L. Clarke. Boulder, CO: Westview Press.

Hilgartner, S. and C. L. Bosk. 1988. The Rise and Fall of Social Problems: A Public Arenas Model. *American Journal of Sociology* 94 (1): 53-78.

Holstein, J.A. and J. F. Gubrium. 1994. Phenomenology, Ethnomethodology and Interpretive Practice. In *Handbook of Qualitative Research*, ed. N. K. Denzin and Y. S. Lincoln. Thousand Oaks, CA: Sage.

Horner, L. L. 2001. *California Cities, Towns, and Counties: Basic Data Profiles for All Municipalities and Counties.* Information Publications: Palo Alto, CA.

Horner, L. L. 2002. *California Cities, Towns, and Counties: Basic Data Profiles for All Municipalities and Counties.* Information Publications: Palo Alto, CA.

Ibarra, P. R. and J. I. Kitsuse 1993. Vernacular Constituents of Moral Discourse: An Interactionist Proposal for the Study of Social Problems. In *Reconsidering Social Constructionism: Debates in Social Problems Theory*, ed. J. A. Holstein and G. Miller. New York: Aldine de Gruyter.

Kasperson, R. E. 1992. The Social Amplification of Risk: Progress in Developing an Integrative Framework. In *Social Theories of Risk*, ed. S. Krimsky and D. Golding. London: Praeger.

Kasperson, R. E., D. Golding, and S. Tuler. 1992. Social Distrust as a Factor in Siting Hazardous Facilities and Communicating Risks. *Journal of Social Issues* 48 (4): 161-187.

Krimsky, S. and A. L. Plough. 1988. *Environmental Hazards: Communicating Risks as a Social Process.* Dover, Massachusetts: Auburn House Publishing Company.

Kunreuther, H. and P. Slovic. 1996. Science, Values, and Risk. *Annals* (AAPSS) 545: 116-125.

McMullan, C and J. Eyles. 1999. Risky Business: An Analysis of the Claimsmaking in the Development of an Ontario Drinking Water Objective for Tritium. *Social Problems* 46 (2): 294-311.

National Research Council. 1998. *Issues in Potable Reuse.* Washington, D.C.: National Academy Press.

Nelkin, D. 1982. Blunders in the Business of Risk. *Nature* 298 (Aug): 775-776.

_____. 1984. Science, Technology, and Political Conflict: Analyzing the Issues. In *Controversy: Politics of Technical Decisions*, ed. D. Nelkin. Beverly Hills, CA: SAGE Publications.

Newcom, J. and E. McCarthy. 1999. *A Layperson's Guide to Water Recycling*. Sacramento, CA: The Water Education Foundation.

Peters, E. and P. Slovic. 1996. The Role of Affect and Worldviews as Orienting Dispositions in the Perception and Acceptance of Nuclear Power. *Journal of Applied Social Psychology* 26 (16): 1427-1453.

Pinholster, G. 1995. Drinking Recycled Wastewater: Can Groundwater Recharge Safely Address the Drinking-Water Needs of Rapidly Growing Urban Areas? *Environmental Science & Technology* 29 (4): 174A-179A.

Pleasanton, Calif. City Council. 1998a. *Minutes of the Meeting of the City Council*. 8 September.

_____. 1998b. *Synopsis of Public Comments at City Council Workshop Concerning Reverse Osmosis Workshop*. 8 September.

_____. 1999a. *Measure J, Arguments, and Rebuttals*. 17 December.

_____. 1999b. *Minutes of the Meeting of the City Council*. 7 December.

Plough, A. and S. Krimsky. 1987. The Emergence of Risk Communication Studies: Social and Political Context. *Science, Technology and Human Values* 12 (3-4): 4-10.

Renn, O. 1992. Concepts of Risk: A Classification. In *Social Theories of Risk*, ed. S. Krimsky and D. Golding. London: Praeger.

Requa, D. 1998. Letter from Dublin, Calif. to Dr. Teng-Chung Wu, Oakland, Calif., 8 June. Transcript in the files of the California Regional Water Quality Control Board, Oakland, Calif.

Serie, P. J., A. L. Dressen, and R. F. Weston. 1991. Negotiating Risks--Public Attitudes toward Risk-Based Decision-Making. In *Waste Processing, Transportation, Storage and Disposal: Technical Problems and Public*

Education, Vol. 2, ed. R. G. Post. Tucson: University of Arizona.

Short, J. F. 1984. The Social Fabric at Risk: Toward the Social Transformation of Risk Analysis. *American Sociological Review* 49 (Dec): 711-725.

Slovic, P. 1993. Perceived Risk, Trust, and Democracy. *Risk Analysis* 13 (6): 675-682.

Slovic, P., B. Fischhoff, and S. Lichtenstein. 1985. Characterizing Perceived Risk. In *Perilous Progress: Managing the Hazards of Technology*, ed. R. W. Kates, C. Hohenemser, and J. X. Kasperson. Boulder, CO: Westview.

Stake, R. C. 1994. Case Studies. In *Handbook of Qualitative Research*, ed. N. K. Denzin and Y. S. Lincoln. Thousand Oaks, CA: Sage.

Strauss, A. L. and J. Corbin. 1998. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. 2d ed. Thousand Oaks: Sage Publications.

Vonheeder-Leopold, G. 1999. Letter from the president of the Dublin San Ramon Services District, Dublin, Calif., to Tri-Valley residents, 5 December. Library, Dublin San Ramon Services District, Dublin, Calif.

Walsh, E. J. 1987. Challenging Official Risk Assessments via Protest Mobilization: The TMI Case. In *The Social and Cultural Construction of Risk*, ed. B. B. Johnson and V. T. Covello. Dordrecht, Holland: D. Reidel Publishing Company.

Zucca, J. 1998. *Memorandum, Report on the Livermore-Amador Valley Water Recycling Projects*. Memorandum from chairman of the Groundwater Management Advisory Committee (GMAC) to John Greci, President, Zone 7 Water Agency Board of Directors, 10 September. Library, Zone 7 Water Agency, Dublin, Calif.

APPENDIX

Table A1. Timeline of RO Controversy

Date	Event
Late 1970's	Slow growth advocates in the Tri-Valley prevail by getting a smaller pipeline to transport wastewater effluent
Mid-1980's	Old pipeline begins to fail
Mid-1980's-Mid 1990's	Slow-growth and pro-growth forces argue over size of new export pipeline
1991-1994	Tentative agreements repeatedly unravel
April 1995	Dublin San Ramon Services District (DSRSD) proposes RO injection to free up disposal capacity
April 1996	Livermore begins construction of its own pilot RO plant (no reinjection)
Early 1997	Pleasanton and Livermore threaten legal action against RO; Grass roots opposition mobilizes in the form of the Safe Water Committee (S.W.C.)
November 1997	DSRSD begins constructing its RO plant
Summer 1998	Zone 7 & Pleasanton withdraw support for RO due to public opposition
Late 1998	DSRSD briefly tables project; DSRSD hires consultants to conduct a 16-week test-run of new RO plant and to conduct public relations campaign
Late 1999	RO injection awaits final approval from Bay Regional Water Quality Control Board (BRWQCB); Pleasanton schedules non-binding ballot measure over RO for early 2000
Early 2000	BRWQCB approves RO injection; RO loses non-binding referendum; Pleasanton and Zone 7 sue over BRWQCB approval
Mid-to-Late-2000	Pleasanton threatens to withdraw financing for new pipeline unless given veto power over RO; Pleasanton approves financing without veto power
May 2001	Ground broken on repair of old/construction of new pipeline
May 2002	Judge rescinds decision authorizing RO
October 2002	DSRSD officially backs off on its policy advocating RO injection

Table A2. Opponent Arguments

Argument	Period 1	Period 2	Period 3
Rhetoric of Loss			
Contamination			
Known Contaminants	17	12	6
Unknown Contaminants	17	5	11
Basin Contamination	9	14	22
Total	43	31	39
'Sewage'	19	14	17
Inadequate Treatment			
Filtering	3	2	5
Safeguards	11	4	8
Monitoring	13	1	2
Source Control	13	2	4
Total	40	9	19
Rhetoric of Endangerment			
Public Health Threat--General	13	6	8
Public Health Threat--Specific	12	1	3
Economic Harm	14	4	9
Financial Harms	15	4	5
Rhetoric of Unreason			
Anti-Growth			
Growth as Ulterior Motive	6	7	11
Public Risk, Developer Benefit	25	9	9
Total	31	16	20
Poor Informing of Public	15	4	6
Public Relations, Not Information	1	6	9
More Testing			
'More Testing'--General	23	7	6
Toxicological--Specific	7	5	1
Epidemiological--Specific	--	6	0
Total	30	18	7
Experimentation	5	4	0
Guinea Pig	6	2	3
Rhetoric of Entitlement			
Anti-Technical			
Inadequacy of Technical Perspective	11	3	7
Past Accidents	6	3	10
Total	17	6	17
Public Input	33	15	19
Ballot Initiative	12	11	8
Anti-Water Scarcity	--	--	36
TOTAL	306	151	225

Table A3. Proponent Arguments

Argument	Period 1	Period 2	Period 3
Rhetoric of Endangerment			
Treatment Process			
Source Control	5	0	1
Efficacy of Technology	19	26	13
Monitoring	17	6	13
Safeguards	16	13	4
'Purification'	3	12	7
Total	60	57	38
Scientific and Technical			
16 Weeks Test	--	22	9
Other Scientific Tests	17	4	1
Regulatory Standards	26	26	14
Water Quality Comparisons	19	37	15
Other Projects	--	11	7
Total	62	100	46
Rhetoric of Calamity			
Water Scarcity	9	23	24
Low-Salt Water Source	--	14	8
Agriculture/Vineyards	--	3	2
Conservation of Delta	--	1	4
Conservation of Lake Del Valle	--	4	0
'Recycling'	2	9	6
Rhetoric of Unreason			
Overcoming Public Perception			
Educating the Public	7	24	13
Public Opinion Polls	--	6	10
Overcoming 'Yuk'	5	2	1
Total	12	32	24
Emotionalism			
Scare Tactics	3	5	7
Anti-Science	5	9	12
Total	8	14	19
Misrepresentations			
No-Growth Motive	3	12	15
National Research Council Study	7	3	0
Other	7	2	3
Total	17	17	18
TOTAL	170	274	189